1961 Volume 19 Issue 6

PREVENTION OF DETERIORATION

ABSTRACTS

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Prevention of Deterioration Center

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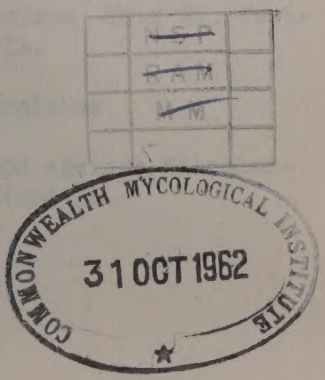

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New dithia-anthracene derivative and fungicidal compositionscontaining them Fung 34. New water-soluble complexes of 8-hydroxy-quinoline and a process for their preparation Fung 35. 4-trifluoromethylsalicylamides Fung 36.

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The classification of wood-destroying fungi by the index number of wood-decomposing type Biol 30.

1961 Biol 25
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Ting-Chien (Academy of Sciences of the USSR. Institute of Microbiology)
STIMULATION BY AN ASSOCIATED BACTERIUM OF CELLULOSE DECOMPOSITION BY AN ACTINOMYCETE (in Russian with English summary)
Izvest. Akad. Nauk S.S.S.R. Ser. Biol. No. 5:760-764 (September/October 1959)

A cellulose-decomposing actinomycete and a Gram-negative bacterium, isolated from a Hutchison's medium enriched soil culture, were identified as Actinomyces melanocyclus Krainsky and Pseudomonas nonliquefaceiens (Eisenb.) Bergey, respectively. In media containing glucose or cellulose, with ammonium dihydrogen phosphate as the nitrogen source, the actinomycete grew considerably better in association with the bacterium than in pure cultures. The stimulation of growth apparently was due to the maintenance of a relatively high pH of the medium by Pseudomonas, which utilized the organic acids formed in the medium. Similar stimulation of growth of the actinomycete was obtained by buffering its pure culture media at pH 6. The oxidation-reduction potential of the medium was considerably lower in mixed cultures than in pure cultures of either organism. The rate of cellulose decomposition by A. melanocyclus mixed cultures was twice the rate in pure cultures. There was no decomposition of cellulose in pure cultures of P. nonliquefaciens.

Bacteria, actinomycetes, cellulolysis, biocoenosis, foreign

PDL-41663

Campbell, Robert N. (Minnesota. University. Dept. of Plant Pathology and Botany, St. Paul)
SOME SAP-STAIN FUNGI FOUND IN MINNESOTA
Plant Disease Reptr. 44:625-628 (Wood 1960)

Fungi, discoloration, identification, wood, Minnesota

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Biol 26
PDL-41588

Gol'din, M.I.
DEEP-SEA MICROBES (in Russian)
Nauka i Zhizn' No. 9:37-40, 50 (September 1960)

This article is a review of a recently published book by A.E. Kriss entitled "Deep Sea Microbiology." The book is a detailed report of 12 yr studies in marine microbiology by a group of Russian bacteriologists under the sponsorship of the Academy of Sciences. Investigations included many scientific expeditions to the Arctic Region, and Pacific and Indian Oceans, and the Caspian and Black Seas. Samples of microflora were collected at all water levels from the surface to the bottom of deep seas. Detailed descriptions and illustrations are given of species of marine bacteria and yeasts and their distribution. For example, numerous bacteria and yeast cells were found under the ice cover of the Arctic Seas (400 cells/liter at a depth of 3700 m). Studies of the distribution and density of marine microorganisms established that the warm currents reaching the Arctic Region flow at a depth of up to 3000 m, considerably deeper than generally assumed. The importance of such studies for the determination of the origin and the course of currents, and also of the productivity of the seas is emphasized. During an expedition to the Pacific Ocean, a new class of cluster-forming filamentous bacteria was discovered. Subsequently similar organisms were found in some other seas, including the Arctic. As a result of metabolic studies on purple bacteria of the Black Sea, the hypothesis is put forward that certain microorganisms can utilize the energy released during decay of radioactive elements, a phenomenon termed 'radiosynthesis', New large-scale expeditions, equipped with the most modern research facilities, are planned by the same team of bacteriologists for the near future.

Microbiology, book, review, foreign

1961 Biol 27
Vol.19 PDL-41687

Tatarenko, E.S., and M.A. Vysotskaya
PRESERVATION OF MOLDS
Microbiology 29:440-442 (January/February 1961)

A mycological collection was preserved without transfer for 5 yr in an unheated building in seasonal temperatures of -30 to +33 C. Two thirds of the molds survived, but many strains had to be revived by Naumov's technique. All Aspergillus sp. survived; only certain strains of A. sulphureus, A. conicus, and A. ochraceus were lost. Most of the many species of Penicillium also survived. Certain Fungi imperfecti were lost including all strains of Monilia sitophila, Botrytis cinerea, and Cladosporium herbarum. Certain mucoraceous molds were seriously affected. Some surviving strains degenerated, but most preserved their cultural and morphological characteristics. A yeast collection survived almost intact.

In a study of preservation of biochemical activity, A. niger and A. oryzae were grown on grapewort agar, Czapek's medium with carbohydrates added, and various cereal grains with soil added. They were vacuum dried and kept for various periods. Results indicate that biochemical properties of molds cannot be improved or fixed by growing time on certain media and that changes in morphological, cultural, and biochemical properties depend on conditions of cultivation. Variability is evident in the entire mold colony.

In formation of stable variants, only a certain portion of a colony (e.g., sector, ring, or center) may be subject to change. Given properties of any culture can be preserved when its hereditary variability is understood. Preservation conditions must be selected for each strain in keeping with its growth and variability characteristics.

Time of formation of conidia varied in different strains. Thus in P. roqueforti, P. chrysogenum, A. niger, and A. oryzae with smooth growth, spore formation occurred within 3 to 4 days of inoculation. Rough forms took longer; a fluffy-growth strain of A. oryzae required 8 to 12 days. Spores of young cultures ger-

minated synchronously and rapidly in 4 to 6 hr; spores of old cultures, at random in 8 to 22 hr. Strains with initially lower germination rates were most affected by extended preservation.

Certain strains with high saccharolytic activity also showed rapid mycelial formation; in 3 hr, mycelium of A. oryzae at 28 C grew 52μ; mycelium of a strain of A. oryzae 81, only 20μ. Use of a strain with synchronous spore development and rapid mycelial growth is advantageous since the growth cycle is completed more rapidly and with less chance of contamination.

Fungi, storage, Aspergillus, Penicillium, Cladosporium

Biol 28
PDL-40811

Newcombe, Margaret (Manchester. University)
SOME EFFECTS OF WATER AND ANAEROBIC CONDITIONS ON FUSARIUM OXYSPORUM F. CUBENSE IN SOIL
Brit. Mycol. Soc., Trans. 43:51-59 (March 1960)

Fungi, Fusarium, soil, biomechanism

PDL-40779

Salmanov, M.A.
MICROBIOLOGICAL CHARACTERISTICS OF KUIBYSHEV RESERVOIR
Microbiology 28:523-529 (July-August 1959) (Translation of Mikrobiologiya. USSR)

Water, storage, bacteria, population, USSR

PDL-40777

Vlodavets, V.V., and L.I. Mats
THE INFLUENCE OF METEOROLOGICAL FACTORS ON THE MICROFLORA OF THE ATMOSPHERIC AIR IN MOSCOW
Microbiology 28:539-544 (July-August 1959) (Translation of Mikrobiologiya. USSR)

Bacteria, atmosphere, population, USSR, seasons, meteorology

1961 Biol 29
Vol.19 PDL-41541

Boidin, J., and A.M. Ginisty
BACTERIA THAT CAUSE RED SPOTS ON SALTED HIDES (in French)
Bull. assoc. franc. chimistes inds. cuir et doc. sci. et tech. ind. cuir 22:205-212 (December 1960)

Five types of halophilic microorganisms were isolated from characteristic red spots on salted calf hides and tentatively identified. Type I (a Halobacterium from the group Cutirubrum salinarium is a small rod-shaped, motile, Gram-negative, proteolytic organism, forming red colonies. Optimum sodium chloride concentration is 20-25%. Type II (Halobacterium cutirubrum) is similar to Type I, but differs from it in a higher proteolytic power, more abundant growth, and less intensely colored colonies. Type III (possibly Halobacterium innocens)is characterized by a marked pleomorphism, lack of motility, and slow growth. It is nonproteolytic. Types IV and V are sarcinae (Sarcina Litoralis and possibly, Sarcina no. 63 R 1 Lochhead, respectively. They also are obligate halophiles, growing in 15 to 31% sodium chloride, nonmotile, Gram-positive, weakly proteolytic and, like the other types, aerobic. They can be differentiated by colony form and size. The cells of Type V are large (2-2.5 μ in. diameter), and form regular packets; organisms of Type IV are small cocci, arranged in packets, pairs and chains.

All types, when inoculated on fresh hides treated with sterilized salt, grew within 3-4 wk, and gave, with the exception of Type V, characteristic red spots. Attempts to isolate microorganisms from purple spots on hides were unsuccessful. Sarcinae and, occasionally, Halobacterium species could be isolated from marine salts, suggesting that some of the halophile infecting hides originate from the salt used for preservation. For isolating halophilic bacteria best results were obtained with Dussault-Lachange medium containing, in gram/liter distilled water, 5 magnesium sulfate, 1 magnesium nitrate, 0.025 ferric chloride, 3.5 Difco Bacto-peptone No. 3, 10 glycerol, 200 sodium chloride, and 10% Bacto-skim milk. The medium was solidified with 3% agar, pH was 7.2-7.5. Because of the high salt

content, no sterilization was needed. An equally suitable medium of pH 8.2 contained a French peptone preparation (Chapoteaut peptone) instead of the Difco product.

Hides, bacteria, identification, foreign, halophiles

PDL-36875

Schmidt, Hans (Bundesferschungsanstalt für Forst und Halzwirtschaft, Reinhek, Ger.)
THE 'BORING' OF THE LARVA OF HYLOTRUPES BAJULUS (in German)
Holz-Zentr. 84:1767 (November 1958)

Beetles, wood, physiology, foreign

PDL-40740

Haraguchi, Takafusa, and Hitoshi Yamaguchi
THE CLASSIFICATION OF WOOD-DESTROYING FUNGI BY THE INDEX NUMBER OF WOOD-DECOMPOSING TYPE (in Japanese with English summary)
J. Japan Forestry Soc. 40:512-514 (December 1958)

Fungi, wood rots, classification, techniques, foreign

1961 Fung 33
Vol.19 PDL-41590

Maruzzella, Jasper C., and Denis Scrandis (Long Island University, Brooklyn, N.Y.)
THE ANTIFUNGAL PROPERTIES OF X-IRRADIATED ESSENTIAL OILS AND OIL COMBINATIONS
Naturwissenschaften 47:282 (June 1960)

Five essential oils and 25 combinations of these oils were x-irradiated with 19.7 r. Oils were caraway, myrrh, niauli, Organum Red, and peppermint. A modified filter paper disc method was used to determine fungitoxicity to cultures on Sabauraud maltose agar of Rhizopus nigricans ATCC 10404, Saccharomyces cereviseae ATCC 7921, Fusarium oxysporum ATCC 9848, and Giberella fujikuroi NRRL 22844.

Individual oils show a slight overall increase in zone of inhibition on irradiation. Whether irradiated or not, the combinations were slightly less active than the individual oils. For 2 days following irradiation the oils and combinations were more odorous than normal, suggesting that antimicrobial properties of the vapors might have been enhanced during this period.

Oils, odor, high energy, fungi, toxic, Rhizopus, Fusarium

PDL-41473

Marsh, Rex E., and Lloyd F. Plesse
SEMIPERMANENT ANTICOAGULANT BAITS
Pest Control 29:28, 58 (August 1961)

Grain baits for anticoagulant rodenticides are prevented from spoiling in moist conditions by concreting in paraffin wax. Treated grain is stirred into molten wax and the thick but flowable mixture poured into open-topped cans of various sizes, cartons and paper cups and tubes which serve as molds. Depending on the type of grain, the ratio of bait to wax ranges from 1 to 1.5 by wt. For rat control in sewers, a 1 gal can of embedded bait is laid on its side, nailed to a length of board, and placed on the manhole apron. A wire linking the can to a top ladder rung anchors the bait and facilitates placement and

inspection. Bait blocks weighing $\leq$ 8 oz and containing crushed oats or barley were well accepted by meadow mice when placed at the base of orchard trees; they withstood sprinkler irrigation and rainfall. House mice readily accepted paraffin baits containing oat grits and canary grass seed, but walnut meats were preferred. Rolled barley-paraffin baits placed in the main runways controlled pocket gophers; 6 to 8 oz sufficed for multiple feedings. Efficacy of anticoagulant baits may be greatly influenced by the gophers' Vitamin K intake. Paraffin bait blocks are also successful against wood rats in mountain homes. The cost of bait blocks may prohibit general field use.

Toxics, rodents

PDL-41267

Merck (E.) A.-G., Darmstadt, Germany
NEW DITHIA-ANTHRACENE DERIVATIVES AND FUNGICIDAL COMPOSITIONS CONTAINING THEM
Gt. Brit. Pat. Spec. 857,383; December 29, 1960. 3 p.

Effective fungicides for use in textiles, organic coatings and plants are 2,3-dicyano-1, 4-dithioanthrahydroquinone and/or the corresponding quinone. 2,3-dicyano-1, 4-dithioanthraquinone is prepared by reacting the disodium salt of 1,2-dicyano-1,2-dimercaptoethene with 2,3-dichloro- 1,4-napthaquinone in either an inert solvent (e.g., methanol, ethanol, xylene, or acetone) or suspension. Catalytic hydrogenation of 2,3-dicyano-1, 4-dithiaanthraquinone produces the hydroquinone.

Fungi, toxic, textiles, coatings(organic), patent

1961 Fung 35
Vol.19 PDL-41684

Maruzzella, Jasper C., Joseph S. Chiaramonte, and Michalyn M. Garofalo (Long Island University, Brooklyn, N.Y.)
EFFECTS OF VAPORS OF AROMATIC CHEMICALS ON FUNGI
J. Pharm. Sci. 50:665-668 (August 1961)

Of 196 listed aromatic chemicals tested in vitro for toxicity of their vapors to growing cultures of four fungi, 124 (63%) produced zones of inhibition on at least one; the remainder were completely inactive. Vapors of 119 were effective to varying degrees against Phoma betae, ATCC 6504, 103 against Oospora lactis ATCC 4798, 103 against Candida albicans ATCC 10231, and 102 against Geotrichum candidum Coll. No. 4762. In general, the chemicals by groups showed the following descending order of activity, the number of each group tested being shown in brackets: acids (3), aldehydes (19), alcohols (24), ethers (4), miscellaneous (7), ketones (14), esters (115), lactones (5), and acetals (5). Wider use of some of these substances might enhance both the germicidal and esthetic qualities of toilet articles and medicaments.

Fungi, toxics, vapors, organic, chemical

PDL-41265

Compagnie Francaise des matières colorantes, Paris
NEW WATER-SOLUBLE COMPLEXES OF 8-HYDROXY-QUINOLINE AND A PROCESS FOR THEIR PREPARATION
Gt. Brit. Pat. Spec. 849,275; September 21, 1960. 4 p.

Cellulosic materials are fungusproofed by single-bath treatment with certain water-soluble metallo complexes prepared by multi-state reaction of 8-quinolinol with (1) a basic salt of trivalent chromium and a monobasic acid (or a chromium derivative capable of providing such a salt during the reaction), and (2) a salt or hydroxide of a polyvalent metal other than chromium. Preparation of the complexes is described.

Aqueous solutions of mixed complexesof 8-quinolinolate

with copper and chromium have a pH of about 4. Suitably buffered (e.g., with hexamethylenetetramine) and containing a nonionic wetting agent, these solutions are used to impregnate fibers/fabrics which are then drained and dried at 100 to 160 C to insolubilize the complexes. Advantages of the process are: (1) near-neutrality of the bath;(2) complete fiber penetration imparting high resistance to laundering;(3) concentrations 5 to 10 times smaller than are required with dispersions; (4) elimination of need for fixative resins; and (5) compatibility of copper 8-quinolinolate with complexes of the chromium stearatochloride type permitting simultaneous waterproofing.

Textiles, fungi, toxic, copper 8-quinolinolate, aqueous, solubilization, patent

PDL-41593

Hauptschein, Murray (to Pennsalt Chemicals Corp. Philadelphia, Pa.)
4-TRIFLUOROMETHYLSALICYLAMIDES
U.S. Pat. 2,967,194; January 3, 1961. 2 p.

Textiles and cordage of cotton or other cellulosics are mildew resistant after treatment with certain amino derivatives of 4-trifluoromethylsalicylic acid, particularly the following: 4-trifluoromethylsalicylamide, 4-trifluoromethylsalicylanilide, 4-trifluoromethylsalicylic acid hydrazide, and 4-trifluoromethylsalicylhydroxamic acid. Methods of preparation are described.

Typically, cotton sheets are dipped in a 4% by wt aqueous solution of 4-trifluoromethylsalicylamide, extracted, and dried. The process is repeated, if necessary, until about 0.1 to 0.5% (by weight of cloth) is retained. The sheets remain resistant to fungi between launderings. The compounds may be incorporated in water-based paints as pesticides.

Fungi, toxic, cotton, coatings(organic), patent

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Fung 37
PDL-41532

Madhosingh, Clarence (Canada. Central Experimental Farm, Ottawa)
THE METABOLIC DETOXICATION OF 2,4-DINITO-PHENOL BY FUSARIUM OXYSPORUM
Can. J. Microbiol. 7:553-567 (August 1961)

Dinitrophenol (DNP) was reduced to the less toxic 2-amino-4-nitrophenol and its isomer 4-amino-2-nitrophenol by Fusarium oxysporum (Schl.) em.Snyder and Hansen in liquid media in the laboratory. There were indications that these compounds also can be altered by the organism. Reduction of DNP was greatest during the first 20 days of incubation in the dark at 27 C, 80% RH, and pH 7.1. Growth of F. oxysporum and reduction of DNP were stimulated by sodium nitrate; the effects were greatest at 1.2%. F. oxysporum produced 2,4-dinitrophenol in media treated with synthetic 2-amino-4-nitrophenol, indicating the presence of a reversible nitro-reducing system in this organism. Such reduction of DNP may have significance in wood preservation.

Fungi, toxic, Fusarium, detoxification

PDL-41691

Klochkov, A.I. and L.A. Kunina
OLIGODYNAMIC ACTION OF CHEMICALLY PURE METALLIC SILVER
Microbiology 29:311-315 (November/December 1960) (Translation of Mikrobiologiya. USSR)

Effects of sulfide film, plastic deformation, and electric fields on the bactericidal action of silver were examined, using 0.8 x 1.8 x 20 mm discs of chemically pure silver. Discs were laid on agar plates inoculated with Escherichia coli and zones of complete inhibition measured.

Antibacterial properties depended mainly on the surface condition of the discs; the purer the silver the greater its toxicity. Bactericidal activity was decreased by a sulfidefilm but plastic deformation (rolling to various degrees of deformation then annealing) had no

appreciable effect.

Various voltages were applied to discs. At high potentials the agar was covered with a thin silver film. At low potentials the negative disc zone was reduced; voltages >0.5 increased it in proportion to increase in voltage. Regardless of voltage, the positive disc zone was about twice that of the control disc.

It is concluded that not the solid metal but only emitted silver ions are bactericidal. Bactericidal silver preparations should be stored hermetically sealed to avoid sulfide formation.

Silver, bacteria, toxic

PDL-41546

Pruthi, Hem Singh, and M.L. Jerath (Punjab University, Chandigarth)
FUNDAMENTAL STUDIES ON INSECTICIDES. PART III. FURTHER INVESTIGATIONS ON THE EFFECT OF TEMPERATURE ON THE TOXICITY OF INSECTICIDES
Natl. Inst. Sci. India, Proc. 27B(1):1-5 (February 1961)

The effect of temperature on the toxicity of endrin, dieldrin, and parathion was tested on Chrotogonus adults. The insects were sprayed at 68 F and kept for 6 hr at 68, 77, or 86 F and 59% RH. The toxicity (as percent kill) of endrin rose from 24.41 at 68 F to 40.2 at 77 F and 49.9 at 86 F; dieldrin, from 22.2 to 38.8 to 65.7; and parathion, from 27.2 to 65.6 to 88.7.

Spray toxicity of endrin for Dysdercus cingulatus and C. trachypterus adults was increased by increase in 24 hr prespray temperature, from 76 to 95 and 68 to 86 F, respectively, but less so than by similar postspray increases in temperature for 6 hr.

Insect, toxics, endrin, dieldrin, parathion

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Mokhnach, V.O., M.A. Litvinov, L.B. Borisov, M.A. Matyko, and M.I. Smirnova-Ikonnikova
THE ANTIBIOTIC PROPERTIES OF IODINATED STARCH AND ITS COMPONENTS
Microbiology 29:327-329 (November-December 1960) (Translation of Mikrobiologiya. USSR)

Iodine-starch and iodine-amylose (the more bactericidal of the two) have a broad spectrum of antimicrobial effect, embracing both Gram-negative and Gram-positive types. Iodine concentrations of 2.5 to 20 µg/ml are bactericidal with 15 min exposure; lower concentrations reduce growth. Iodine-amylopectin (iodine at 10 µg/ml) completely inhibited growth of Staphylococcus aureus and Escherichia coli. Iodine chloride (iodine at 2.5 µg/ml) affect S. aureus and E. coli.

Discoloration of the iodine-polysaccharides by alkali kills their antibacterial activity, apparently by destroying the staining/antimicrobial centers formed by iodine cations or polarized iodine molecules. Alkaline metal iodides, in which the iodine anions are colorless, are bactericidally inactive.

Iodine compounds(organic), bacteria, toxicity

PDL-41269

Compagnie Francaise des matiéres colorantes, Paris
NEW COMPLEX SOLUTIONS OF COPPER 8-HYDROXY QUINOLATE AND THEIR PROCESS OF PREPARATION
Gt. Brit. Pat. Spec. 849,274; September 21, 1960. 3 p.

A fungicidal aqueous solution of copper 8-quinolinolate is prepared by heating in an alcoholic solution of a water-soluble complex of the Werner type in which the anion is monovalent and the cation contains trivalent chromium coordinated with an organic component.

Typically a mixture of 5 parts copper 8-quinolinolate with 95 parts alcoholic solution of chromium stearatochloride is refluxed 1 hr. Thirty parts of the resultant clear, green-brown solution (soluble in water in all

proportions) is dissolved in 500 parts water, 100 parts of an aqueous 4% solution of hexamethylenetetramine is added, and the mixture made up to 1000 parts with water. Cotton twill steeped 15 min therein in the cold, drained to 100%, and dried at 100 to 110 C is rendered water- and fungusproof.

Cotton, fungi, toxic, copper 8-quinolinolate, aqueous, solubilization, patent

PDL-41703

Bhargava, P.N., Kamalini Bhargava, and R.C. Kapoor
STUDIES ON 2-O-ANISYLIMINO-3-O-ANISYL-4-THIAZOLIDIONE, 3-O-ANISYL-2,4-THIAZOLIDIONE, 2-O-PHENETHYLIMINO-3-O-PHENETHYL-4-THIAZOLIDONE, 3-O-PHENETHYL-2, 4-THIAZOLIDIONE, AND THE FUNGICIDAL ACTIVITY OF THE ACETOXYMERCURI DERIVATIVES OF THE THIAZOLIDIONES
J. Indian Chem. Soc. 38:23-26 (January 1961)

Fungi, toxics, thiazolidiones, synthesis, tests

PDL-35807

Rhem, Hans-Jürgen, and Ursula Stahl
ON THE ACTION OF ANTIMICROBIAL SUBSTANCES IN COMBINATION (in German)
Naturwissenschaften 46:431-432 (July 1959)

Fungi, Aspergillus, bacteria, toxics, synergists, interactions, foreign

PDL-41847

A CHEMICAL FOR CONTROLLING WATER SLIMES
Engineering 192:414-415 (September 1961)

Microorganisms, slimes, toxics, water system

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Lac 33
PDL-41790

Estrada, Neil S., and Lawrence Graubart (Reichhold Chemicals, Inc., White Plains, N.Y.)
POLYESTER COATINGS FOR METALS
Materials in Design Eng. 54(4):11-13 (October 1961)

Polyester resins provide protective and decorative coatings with excellent outdoor durability and good resistance to water, salt spray, many chemicals, impact, abrasion and flexure. By means of a dual-head gun, coatings can be applied as 100% solids in thicknesses up to 15 mils in one coat even on vertical surfaces. Coatings cure at ambient temperature. Data on formulation, application and performance are presented; chemical and mechanical properties are compared with those of other coating resins. For maximum adhesion and corrosion protection, metal surfaces should be sandblasted and primed with an epoxy-polyamide—zinc chromate system. Successful applications include storage tanks, tank cars, piping, valves, ship hulls, metal signs and industrial processing equipment. The cost is lower than that of comparable alkyd resin coatings and much lower than that of epoxies and vinyls.

Coatings(organic), metals, polyesters, review

PDL-41539

Eveleigh, D.E. (Exeter. University)
FUNGAL GROWTH ON PAINTED SURFACES
Paint Technol.24(277):22 (December 1960)

. Phoma violacea, a common nonpathogenic mold often associated with glass house interiors, painted with white lead also grows on titanium oxide and zinc oxide paints. Its red pigment is produced on many (especially starch based) substrates. The pigment is soluble in oil but only slightly soluble in water; growth on emulsion paints produces only a general darkening due to the dark mycelium. The fungus can penetrate paint from above and below the film; infection is often deep-seated, e.g., in window frames. Standard fungicidal washes kill the mold, but the

pigment remains and may diffuse rapidly causing discoloration of a subsequent coat of oil paint. P. violacea is no more resistant to fungicides than Pullularia pullulans or Cladosporium herbarum. Resistant strains of all three can be induced, however, by long term exposure to fungicides in the laboratory.

Fungi, discoloration, coatings(organic)

PDL-41235

Privett, O.S., M.L. Blank, J.B. Covell, and W.O. Lundberg (Minnesota. University. Hormel Institute, Austin)
YELLOWING OF OIL FILMS
J. Am. Oil Chemists' Soc. 38:22-27 (January 1961)

Yellowing of drying oils seems to involve two distinct steps, the formation of colorless precursors by an oxidative mechanism, followed by a further reaction of the precursors to give the yellow compounds. Yellowing probably involves a reaction of active centers in the precursor molecules in some type of condensation. This is supported by the observations that yellowing can be induced by heating aged, nonyellowed films in vacuo (nonoxidative process), and that low-molecular-weight aldehydes containing an active methylene group are effective inhibitors of yellowing.

No specific physical or chemical properties could be related quantitatively to the yellow compounds or their precursors. Colored compounds are inhomogeneous and present an extremely small concentration. Chemical additives that inhibit yellowing probably do so by substituting for some reactant in a way that will yield a nonyellowed adduct with the precursor.

Oils, drying, films, discoloration

1961 Lac 35
Vol.19 PDL-41527

Sanzharovskii, A.T.
METHODS FOR THE COMPUTATION OF INTERNAL STRESSES IN POLYMERIC VARNISH COATINGS (in Russian)
Doklady Akad. Nauk SSSR 135:58-60 (1960)

A method for calculating internal stresses in any type of polymeric protective coating on the surface of any elastic material is based on the following considerations: (1) During drying or polymerization of the coating film on a flat elastic surface, the volume of the film is reduced, tending to compress it.(2) The base material to which the film is bound by adhesion forces counteracts the compression of the film and, as a result, the coating film becomes stretched, whereas the base becomes compressed. (3) The equation expressing internal stresses in the film can be derived from an analysis of forces acting in the coating/base system, notably the compressing force of the stretched film (equal to the product of its relative elongation, its cross-sectional surface area, and its elasticity modulus), the bending force moment acting on the base (equal to the product of the compression force and half the sum of the film and the base thicknesses), and the corresponding stresses in the base, which depend on its surface area and its cross-sectional moment of inertia, respectively. The internal stresses in the film can be calculated in four different ways, viz., from the camber of the base; vertical deviation of the coated base when suspended by one end; total stress in the base on the noncoated side (measured on metal bases by the resistance method); and from the total stress in the base on the coated surface (measured by optical methods). The formulas for each method and the corresponding diagrams are given.

Coatings(organic), stress, calculation, foreign

1961
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Lac 36
PDL-41485

Vannoy, Wesley G. (E.I. du Pont de Nemours and Co., Inc., Wilmington, Del.)

EMULSION PAINTS ON WOOD

Official Digest 33:807-829 (July 1961)

Long-term performance data indicate that long life and good appearance are possible with properly formulated exterior emulsion coatings. Repaint application over chalky or crumbly surfaces should be preceeded by special priming or surface conditioning. Tested on yellow pine, a water redispersible homopolymer poly(vinyl acetate) (PVA) emulsion formulated at 20% pigment volume shows good film integrity. PVA and acrylic emulsion paints on new wood are resistant to film failure under adverse moisture conditions. First coat reductions with tung oil or long oil alkyd vehicles promise improved adhesion to chalky substrates without inducing blistering, but require further evaluation. The use of clear or lightly pigmented emulsions as sealers to control cedar bleeding merits attention. Both a water resistant homopolymer and a copolymer PVA emulsion paint show exceptionally good color retention. Copolymer PVA and acrylic emulsions pigmented with titanium dioxide (Ti-Pure R-900) and tinted with Monastral Red, Green-Gold, Green, or Blue promise good color retention. Staining of certain white Type A PVA coatings is attributed, at least in part, to inadequate antifungal protection by 0.2% Dowicide A; mercurial fungicides were successful with both PVA and acrylic emulsions. More build is needed in emulsion coatings to obscure imperfections of the substrate.

Coatings(organic), vinyl acetate, acrylic, polymers, wood, weathering, emulsion, water base

1961
Vol.19

Lac 37
PDL-41621

Muromtsev, A.K., and I.P. Shabodalov
ATMOSPHERE-RESISTANT COATINGS BASED ON COPOLYMERS OF VINYL CHLORIDE AND VINYL ACETATE (in Russian)
Lakokrasochnye Materialy i ikh Primenen No. 5:18-21 (1960)

A comparative study was made of the weather resistance of coatings based on two different vinyl chloride-vinyl acetate copolymers (A-15 and A-15-0) and coatings based on vegetable oils, alkyd resins, a perchlorovinyl resin, a vinyl chloride-vinylidene chloride copolymer, and a mixture of the latter with a phenolic resin. Coated samples were exposed for 4 mo to 3.5 yr to sea water immersion, to a polluted industrial atmosphere, a rural atmosphere, and marine atmospheres in various climates from the arctic to the tropics. Laboratory tests also were carried out on phosphate primed metals with top coats of the A-15 and A-15-0 copolymers.

The following general conclusions were drawn. Coatings based on the A-15 and A-15-0 copolymers are characterized by good adhesion and good mechanical properties. They have considerably higher weather and sea water resistance than coatings based on any of the other resins tested. Under laboratory conditions metal samples coated with a phosphate primer and either of the vinyl copolymer based coatings containing zinc oxide pigment, carbon black and ultramarine were well protected when partially immersed in water or in a 3% sodium chloride solution. The coatings adhered well and did not deteriorate during a 2 yr exposure period.

Vinyl chloride, vinyl acetate, polymers, coatings(organic), sea water, weathering, foreign

1961
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Lac 38
PDL-37737

Bührer, E., Fr. Knapp, K. Österle and P. Schneider
ON THE USEFULNESS OF SIMPLE TEST METHODS FOR COMPARING LACQUERS
Schweiz. Arch. Angew. Wiss. u. Tech. 25:361-368 (October 1959)

Coatings(organic), tests, comparison, foreign

PDL-36960

Oeteron, K.A. van
PAINTS FOR UNDERWATER USE (ANTIFOULING PAINTS) (in German with English summary)
Werkstoffe u. Korrosion 11:209-212 (April 1960)

Coatings(organic), comparison, underwater, foulers, toxic, foreign

PDL-41854

Glaser, Milton A., R.E. Caplan and R.W. Clope (Midland Industrial Finishes Co., Waukegan, Ill.)
HIGH TEMPERATURE RESISTANT ORGANIC COATINGS
Official Digest 33:1197-1214 (October 1961)

Coatings(organic), temperatureproof, silicones, fluorocarbons, alkyd, polymers, review

PDL-35998

Schuster, H.J.
ON THE BEHAVIOR OF METALLIC ZINC IN PAINTS (in German with English summary)
Werkstoffe u. Korrosion 10:490-494 (August 1959)

Coatings(organic), zinc, iron, corrosionproof, mechanism, foreign

1961 Met 87
Vol.19 PDL-41644

U.S. Dept. of the Air Force. Air Force Research Division. Aeronautical Research Laboratory, Wright-Patterson Air Force Base, Ohio (U.S. National Bureau of Standards — Gwendolyn B. Wood and Abner Brenner)

A STUDY OF EMBRITTLEMENT OF HIGH STRENGTH STEELS BY THE HYDROGEN ISOTOPES

ARL Technical report 60-309;...ASTIA Doc. 250257 (December 1960) 47 p.

The mechanism of hydrogen embrittlement was studied by analysis of gas content of embrittled specimens. Specimens consisted of rings of 4130 steel, 2.54 cm in diameter, 0.9 cm long and 0.08 cm wall thickness. They were electrolytically charged in 10% sodium hydroxide, cyanide copper and cadmium plating baths and chromic acid type chromium plating bath. Charging solution included various mixtures of a 10% solution of NaOD in D_2O with a 10% solution of NaOH in water. Measure of embrittlement was taken as the decrease in either the crushing load or the deformation at failure as compared to a control specimen. The gas electrolytically induced into the specimen was liberated by vacuum fusion apparatus and analyzed with a mass spectrograph.

Deuterium embrittled 4130 steel but to a smaller extent than hydrogen. On the other hand, specimens embrittled in solutions made with heavy water contained a larger volume of gas (deuterium) than specimens similiarly treated for the same length of time with an ordinary water solution.

No correlation was found between the degree of embrittlement of steel and the gas content. There was a rough parallelism between the degree of embrittlement and the gas content of the steel if only one variable of operation, e.g., period of metal deposition, was involved.

About 90% of the embrittling gas (hydrogen or deuterium) escaped from unplated, cathodically charged specimens in a few hours. In the electrolysis of a mixture of heavy and ordinary water on a hollow steel cathode, the hydrogen/deuterium ratio of the gas which permeated into the interior of the tube was about 10 fold larger than the hydrogen/deuterium ratio of the solution.

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Electrolytically evolved deuterium did not undergo isotopic exchange with the hydrogen initially present in the steel.

Steel, hydrogen, isotopes, brittleness, mechanism

PDL-39465

Ashbaugh, W.G., and S.E. Doughty
BIMETALLIC HEAT EXCHANGER TUBES SOLVE DUAL CORROSION PROBLEM
Metal Progress 78(6):115-117, 128, 130, 132 (December 1960)

Failure of heat exchange tubes, usually made of stainless steel, was prevented by changing to bimetallic tubing. Copper or brass on the outside prevents pitting and stress corrosion cracking caused by brackish cooling water; stainless steel on the inside withstands corrosive action of chemicals being processed. Example of bimetal tubes successfully used in chemical plants include 0.035 in. deoxidized copper on Type 304 welded stainless tubing (18 gage); 20 gage copper on 18 gage stainless; and 19 gage admiralty on 16 gage Type 304 stainless. The bimetallic tubing is mechanically bonded by placing one tube inside the other and cold drawing through a die to the specified size. One of the walls, usually the stainless steel, must be thick enough to withstand operating pressure. Heat transfer of the tube will be less than that of an all stainless steel tube but it will usually be satisfactory if there is a good bond along the full length and surface. Heat transfer can be improved by design change to increase the tubular surface and by use, where possible, of high velocity water or condensing steam. Maintenance involves only periodic flushing of the shell with cleaning acid.

Pipe, heat transfer, corrosionproof, stainless, copper, copper alloys

1961 Met 89
Vol.19 PDL-41249

Husock, Bernard (Harco Corp., Cleveland, Ohio)
USE OF PIPE-TO-SOIL POTENTIAL IN ANALYZING UNDERGROUND CORROSION PROBLEMS
Corrosion 17:97-101 (August 1961)

Pipe-to-soil potential profiles can be used to distinguish stray current (electrolytic corrosion) from galvanic and bimetallic corrosion.

Stray currents arising from electric railways are rarely constant, fluctuating potentials indicate their presence. Nonfluctuating stray or interference currents from cathodic protection systems cannot be detected in this way. Generally both in electrolytic and galvanic action, anodic areas exist at locations where the lateral measurements are less negative than over-the-pipe measurements. If galvanic action predominates, the anodic areas coincide with areas of high negative potential. If corrosion activity is either electrolytic or bimetallic coupling, anodic areas coincide with areas of low negative potential (or in severe cases a positive potential). In either situation the less negative (or more positive) the potential the more anodic is the area.

Potential profiles are given for (1) galvanic corrosion activity: (2) pipe subject to cathodic protection interference; (3) underground coated pipeline; (4) coated pipeline connected to copper grounding system, and (5) bimetallic effect.

Under nonstray current conditions which are not subject to metallic influence and cathodic protection, potentials of steel pipelines are governed by the following field derived rules: (1) Potentials are more negative for newer than older pipes and for pipes with organic coatings than for bare pipes. (2) Variation of potential with distance is greater for bare than for coated pipes. (3) Potentials for bare pipes range from -500 to -600 mv; for coated pipes, between -650 and -750, being more negative for new than for older pipes. (4) In highly alkaline soils, potentials are less negative than in neutral or acid soils. (5) On bare pipes, locations of higher soil resistivity correspond with

locations of lower negative potential and vice versa. These rules are applied to analyze three pipe line systems and one electrical ground system.

Pipe, corrosion, soil, mechanism

PDL-41551

Bhatt, Harshad J., and E. H. Phelps (United States Steel Corp. Applied Research Laboratory, Monroeville, Pa.)
EFFECT OF SOLUTION pH ON THE MECHANISM OF STRESS CORROSION CRACKING OF A MARTENSITIC STAINLESS STEEL
Corrosion 17:98-102 (September 1961)

In 3% sodium chloride solution saturated with oxygen, stress corrosion failure time of 12 MoV stainless was shortest at pH 1, increasing gradually as the pH increased from 3 to 11. No stress corrosion cracking occurred at $\geq$ pH 11.5. Anodic polarization caused relatively rapid cracking at pH 1, 6.5, and 12.5; the mechanism of cracking was corrosion along an active path through the steel. Cathodic polarization at relatively high current densities also caused cracking at pH 1, 6.5, and 12.5, but under these conditions hydrogen enters and diffuses through the steel. Without applied current at pH 6.5, the mechanism is corrosion along an active path, but at pH 1, either this mechanism or hydrogen embrittlement could cause cracking. Evidence indicates it is the latter.

Stainless, alloying agents, molybdenum, vanadium, corrosion, stress, pH

PDL-35804

Wild, Max
NATURAL SEA WATER EXPOSURE OF UNALLOYED AND LOW ALLOY STEELS (in German)
Stahl u. Eisen 79:940-948 (June 1959)

Steel, corrosion, sea water, foreign

Deterioration
NRC

1961 Met 91
Vol.19 PDL-37635

Mitchell, K.W., H. King and E.A. Brandes (Fulmer Research Institute, Ltd., Stoke Poges, Eng.)

THE EFFECT OF PROTECTIVE COATINGS ON THE PROPERTIES OF FERRITIC STEEL AT 650 C

Metallurgia 61:15-23 (January 1960)

Prevention of oxidation and scaling of steel by deposition of aluminum or chromium coatings results in extended life under creep or fatigues stresses, providing that any softening of the steel produced by the coating process is more than compensated for by the improved oxidation resistance.

Results are presented of tests on 12 swg sheet of mild steel, Mo-B, Mo-V, and Cr-Mo-V-W low alloy ferritic steels. The first three have poor inherent oxidation resistance. Aluminum coatings were applied by hot dipping and by metal spraying followed by a diffusion treatment. Chromium coatings were deposited from chromium chloride vapor with simultaneous diffusion.

On Mo-V steel, hot dipping in aluminum prevented oxidation without adversely affecting creep and fatigue strengths at 650 C. Retention of good creep properties makes it competitive with a 14% Cr, 19% W austenitic steel.

Hot dipping of untempered mild steel and Mo-B steel produced softening at the process temperature which reduced the creep and fatigue endurance at high stresses. At low stresses, however, creep rupture times and endurance in fatigue were increased due to prevention of oxidation. With Cr-Mo-V-W steel, where oxidation is inherently good, the added protection conferred by the coating was insufficient to compensate for loss in strength.

Aluminizing increased endurance at low fatigue stresses with mild steel and Mo-B steel and at all fatigue stresses for the Mo-V steel.

Chromizing although providing a good oxidation resistant coating, resulted in a marked loss in core strength through decarburization and softening during the coating process. This could be partially offset by subsequent heat treatment. The fatigue enduranced tended to be less

affected at low stresses giving long endurances.

Steel, coatings(metallic), aluminum, chromium, high temperature, mechanical properties

PDL-41238

Hersch, P. (Arthur D. Little, Research Institute, Inveresk, Midlothian, Scot.)
LOCALIZATION OF FERROUS CORROSION BY AZIDE
Nature 190:163-164 (April 1961)

Mild steel normally remains immune in aqueous azide solution. If, however, the metal is submerged in 1 M sodium azide containing 0.2 M sodium chloride, scratched with a glass needle and an anodic potential immediately applied, a sharp red line of ferric azide appears instantly along the scratch. This localized corrosion also is producible in a high carbon steel, several low alloy steels, some cast irons, 13% and 17% chromium irons, but not in austenitic 18-8 type steels.

Voltage and concentrations are not critical for this 'bleeding' effect to occur, as long as there is present a certain combination of oxidant, stimulator, inhibitor, and reagent. In the example above, the anodic potential provides the oxidizing condition, sodium chloride acts a stimulator, and sodium azide functions both as inhibitor and reagent of the product of attack. A variety of 'right' combinations are given. The mechanism of rust inhibition of sodium azide cannot be explained by any of the usual mechanisms.

Ferrous, sodium azide, corrosionproofer, aqueous

PDL-36958

Csokán, P. and G. Sinay
INVESTIGATION OF THE MECHANICAL PROPERTIES OF HARD-OXIDIZED ALUMINUM SHEETS (in German with English summary)
Werkstoffe u. Kossosion 11:224-227 (April 1960)

Aluminum, anodized, procedure, mechanical properties, foreign

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Met 93
PDL-41683

Marshakov, I.K., and A.N. Zanina
MECHANISM OF THE WATER LINE CORROSION OF IRON (in Russian with English summary)
Zhur. Fiz. Khim. 35:206-211 (January 1961)

The water line corrosion of iron in 0.17 M sodium chloride solution containing 0.058, 0.070, 0.085 or 0.1 M sodium sulfate and 0.1 M sulfuric acid was studied. In acid solution and in solutions containing studied. In acid solution and in solutions containing corrosion inhibitors such as dichromate, nitrite and especially phosphate, intensive destruction at the water line occurs. In neutral solutions there is no accelerated corrosion but under certain conditions intensive local attack occurs. This localized corrosion results from activity of differential aeration couples formed as a result of the difference in access of oxygen to the iron along the water line and in the bulk of the electrolyte. In acid solutions, intensive etching of the iron along the water line is due to the action of corrosion macrocells of which the anode is iron, rather than to preferential deposition of corrosion products at the air-water interface as formerly believed. The cause of such cells is the rapid increase in pH of the electrolyte from which the meniscus is formed. In neutral solutions containing inhibitors the mechanism of water line corrosion is the same as in the corrosion of iron in narrow slits and crevices. Active-passive cells are formed due to hindered access of the inhibitor to the electrolyte from which the miniscus is formed.

Corrosion, iron, water, interface, mechanism, foreign

PDL-37736

Radeker, Wilhelm
POSSIBLE TRANSITION BETWEEN STRESS CRACK CORROSION AND PITTING IN MILD STEELS (in German)
Arch. Eisenhüttenw. 30:747-750 (December 1959)

Steel, corrosion, stress, pitting, mechanism, foreign

1961 Met 94
Vol.19 PDL-41808

Chicago. University. Argonne National Laboratory, Lemont, Ill. (R. D. Misch)

ELECTRICAL RESISTANCE STUDIES OF ANODIC AND CORROSION OXIDE FILMS FORMED ON ZIRCONIUM

Report ANL-6259 (Metallurgy and Ceramics) (May 1961) 36 p.

Oxide films produced on zirconium and zirconium-titanium alloys by anodizing and by exposure to oxygen and water at elevated temperatures, were examined by using evaporated aluminum and the zirconium substrate as electrical contacts.

At room temperature in air, anodic films had higher resistivities than corrosion films, but both were essentially insulators. When corrosion films were heated in a vacuum to 185 and 290 C, resistance dropped, and the films became semiconducting. Above 300 C, resistances showed a slight drift which may be attributed to irreversible diffusion changes.

Oxide film resistances on zirconium alloys containing 0.05 to 0.50 w/o titanium did not drop significantly with titanium content, although the corrosion rate increased rapidly in this range. Such films showed potential differences in both air and vacuum. Zirconium was positive with reference to the evaporated aluminum film. Potential differences remained during heating to 290 C in vacuum and were used to determine the resistance. Potential differences were relatively independent of titanium content up to 0.5 w/o titanium. In a series of alloys containing 10 to 95 w/o titanium the film resistances were much lower and dropped as a function of titanium content. Potential differences were absent in most films on the high titanium alloys.

The results suggest that the measurements isolated from corrosion conditions did not reflect differences present during corrosion. It was concluded that measurements of electrical properties of corrosion films should be made during corrosion and that by anodizing zirconium the corrosion rate could be lowered,

but the effect was temporary. Evidently, anodic films influenced the corrosion process only until the film had equilibrated with high temperature water.

Zirconium, zirconium alloys, anodizing, oxides, corrosion products, electric properties

PDL-41552

Dingley, W. (Canada. Dept. of Mines and Technical Surveys)
LABORATORY DEVELOPMENT OF CORROSION INHIBITING COATINGS FOR MINE HOIST WIRE ROPE
Corrosion 17:22-23, 26-27 (September 1961)

Laboratory tests based on intermittent immersion in 5% sodium chloride solution show that a 1:1 mixture of road grade asphalt and zinc chromate thinned with trichloroethylene is a better preservative for mine hoist zinc coated steel than a number of presently used compounds. It may be applied by brush, spray or dip to new or used ropes (even when wet or lightly rusted), and over other compounds. It is highly penetrative, dries rapidly, and adheres well against flexure. Different zinc chromate pigments(not specified) vary considerably in efficacy.

Wire, steel, corrosionproofer, coatings(metallic), zinc

PDL-41189

Gt. Brit. Royal Aircraft Establishment, Farnborough (H.C. Davis and J. Houseman)
THE CORROSION PROTECTION AFFORDED TO AIRCRAFT JOINTS BY ANTI-FRETTING COMPOUNDS. PART I
Technical Note. Met/Phys 329 (September 1960) 11 p.

Lubricants, joints, steel, aluminum alloys, fretting, molybdenum disulfide

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Caule, E.J.,K.H. Buob, and M. Cohen (National Research Council, Canada. Division of Applied Chemistry)
OXIDATION OF IRON IN THE TEMPERATURE RANGE OF 260° - 470° C
J. Electrochem. Soc. 108:829-834 (September 1961)

The oxidation of ingot iron in 19 mm oxygen over the temperature range 260-470 C leads to the formation of a two layer film containing magnetite (Fe_3O_4) next to the metal and hematite (α-Fe_2O_3) in the outer layer.

In the initial period of oxidation the magnetite layer grows rapidly to a value which is constant for a time which, in general, decreases with increase in oxidation temperature. When the magnetite starts to grow again, the overall growth rate increases by a factor of about two, although this final rate is still parabolic. There is also an increase in activation energy for total growth above 410 C; during this second period growth of both hematite and magnetite tend to decrease in rate with time. The low activation energy indicates that the controlling transport process is not diffusion of metal ions but oxygen, which can be transported either as molecules through cracks or as ions through the lattice. Partition of oxygen between the two layers is some unknown function of thickness, temperature and oyxgen pressure.

Iron, oxidation, high temperature

PDL-41250

Talbot, R.C., R.N. Hobbs and W.A. Szymanski (Hooker Chemical Corp., Niagara Falls, N.Y.)
RELATIVE CORROSION RESISTANCE OF BASIC OXYGEN STEEL AND OPEN-HEARTH STEEL
Corrosion 17:83-84 (August 1961)

Duplicate 53 sq cm specimens of open-hearth steel, ASTM-A-53, and basic oxygen steel ASTM-A-120 were immersed for 40 days in sodium hydroxide plus sodium chloride, sodium chloride alone, steam, steam condensate,

city water, potassium hydroxide, chlorine, perchloric acid, and sulfuric acid. Differences in corrosion resistance between the two steels were not significant although basic oxygen steel may have a slight advantage for perchloric acid and dry chlorine exposure.

Steel, corrosion, water, aqueous, sodium chloride, chemicals

PDL-41236

Edeleanu, C. (Tube Investments Ltd., Cambridge, Eng.)
THE PROPAGATION OF CORROSION PITS IN METALS
J. Inst. Metals 89:90-94 (November 1960)

A quasi-autocatalytic reaction is used to explain why, in pitting corrosion, the anodic reaction occurs more readily at some places than others. In the system aluminum/sodium chloride solution it was demonstrated experimentally that the rate of corrosion per unit of active area is a constant and that changes in an external polarizing current which alter the apparent rate of pitting influence only the area on which the attack occurs and not the real rate of attack per unit of active area.

Metals, aluminum, corrosion, pitting, mechanism

PDL-40739

Mantovani, Giorgio
CHARACTERISTICS AND CONDITIONS OF USE OF VAPOR-PHASE INHIBITORS (in Italian)
Gazz. chimi. ital. 89:1687-1690 (July-August 1959)

Metals, corrosion, vaporphase inhibitor, application, humidity, temperature, octadecylamine, sodium nitrite, foreign

1961 Met 98
Vol.19 PDL-41829

Krulfeld, M. and M.C. Bloom (U.S. Naval Research Laboratory, Metallurgy Division)

CORROSION MECHANISMS (THE EFFECT OF NONADHERENT CORROSION PRODUCTS ON LOCALIZED ATTACK OF STEEL EXPOSED TO AQUEOUS MEDIA AT ELEVATED TEMPERATURE)

Report of NRL Progress p.26-29 (July 1961)

Evidence is given that nonadherent corrosion products cause local deterioration in steel at elevated temperature in aqueous media by forming oxygen concentration cells. Steel specimens with α-Fe_2O_3 packed in drilled cavities were placed in 0.04%, 0.4% and 4% H_2O_2 solutions, sealed in autoclaves, and kept at 600 F for 1 day, 1 wk, and 4 wk.

Metallographic examination showed areas of attack in cavities of specimens immersed in the 4% H_2O_2 solution, the amount of attack being greater for longer exposure time. All specimens, except one in 0.4% and one in 0.04% solutions, showed no sign of accelerated attack. Since the 4% solutions were the only ones still highly oxygenated at the end of the test absence of attack may have been due to a rapid decrease of oxygen level in these weak solutions either through its combination with corrosion-generated hydrogen or by direct reaction with the metal. Possible corrosion under relatively low oxygen levels maintained for a long time is not ruled out.

Nonadherent metallic copper also acted like corrosion products in forming oxygen concentration sites.

Steel, corrosion, aqueous, high temperature, mechanism

1961 Met 99
Vol.19 PDL-41615

Tomashov, N.D., Yu.N. Mikhailovsky and V.V. Leonov
MECHANISM OF THE ELECTROCHEMICAL CORROSION OF IRON UNDER INSULATION COATINGS. III. INVESTIGATION OF THE WORK OF MACROCORROSION COUPLES FORMED ON PARTIAL INSULATION OF THE METAL SURFACE WITH PROTECTIVE FILMS (in Russian with English summary)
Zhur. Fiz. Khim. 35:736-742 (April 1961)

Previous work established that the presence of an insulating film on a metal does not necessarily prevent its corrosion. In the present study the work of macrocorrosion couples formed when a partially insulated metal is in contact with an electrolyte was investigated. The test metals were copper, iron, aluminum, and zinc wires 1 mm in diameter and 50 mm long. The insulating coatings (1 to 6 μ thick) were bitumen, paraffin, Bakelite, nitrocellulose, a drying oil, an oil-base white (zinc oxide) paint, and an oil-base minium paint. The electrolyte was a solution containing 0.5 N sodium chloride, 0.016 N hydrogen peroxide, and 0.01 N hydrochloric acid. Tests were carried out at room temperature, and included measurements of corrosion currents in cells with insulated(coated) and noninsulated test metal as electrodes, and measurements of resistance and capacitance of insulated test metal electrodes. The last two measurements were made in a cell consisting of the test electrode, a copper-copper sulfate half cell, and an auxiliary electrode.

For all metals and all coatings tested, the insulated electrode had a more positive potential and acted as the cathode in the corrosion cell. As the corrosion process progressed the capacitance of the insulated electrodes gradually increased and their resistance gradually decreased. For most metals, the corrosion currents stabilized within 20 to 25 hr. The potentials of the insulated electrodes varied with film thickness, generally shifting toward more positive values with increasing thickness. For each type of film, the density of the corrosion current increased in the order: copper > aluminum > iron > zinc. The capacitance of the insulated electrodes increased in the same order. The

origin of the corrosion of coated metal surfaces is the development of conductivity in the thinner or defective spots in the coating, resulting from a potential difference between metal surface and film. The more negative the corrosion potential of the metal, and the more positive the oxidation-reduction potential of the electrolyte, the greater the potential difference. The porosity and often the discontinuity of the film are the cause of the electrochemical heterogeneity of the surface of the coated metal. Cathodic processes occur, essentially, in the conductive zones of the film; anodic dissolution of the metal, mainly in its pores and capillaries, results in localized corrosion. If the total cathodic surface area greatly exceeds the anodic surface, then, because of the high density of the anodic current the metal in the pores becomes strongly polarized, and the potential of the insulated zones (electrodes) is shifted toward more positive values. The protective action and the degradation rate of films are determined not by the nature of the insulating material, but by the electrochemical properties of the metal and of the corrosive medium. Conductivity of the film may not be the sole factor determining metal corrosion; diffusion processes, for example, also may play an important role.

Metal, corrosion, coatings(organic), mechanism, foreign

PDL-36221

Marwedel, Georg
CORROSION PROTECTION OF BRASS (in German)
Farbe u. Lack 65:64-71 (February 1959)

Copper alloys, brass, corrosionproofer, coatings (organic), foreign

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Met 101
PDL-41523

Lorking, K.F., and J.E.O. Mayne (Cambridge. University)
THE CORROSION OF ALUMINUM
J. Applied Chem. (London) 11:170-180 (May 1961)

The room temperature corrosion of aluminum in nine decinormal solutions over the pH range of 2.0 to 12.0 was found to be more dependent on the nature of the anion than on the pH of the solution. The solubilities of hydrated and anhydrous aluminum oxide were examined and it was concluded that, except in the presence of chloride ions, corrosion was associated with the initial rate of solution of the anhydrous oxide; solubility of hydrated oxide was not a factor. In benzoate, chromate, sulfate, phosphate and citrate solutions, corrosion was inhibited when the initial solubility of the anhydrous oxide was less than 10^{-4} gm-ions/liter.

Potential and anodic polarization measurements indicated that, whereas the normal anodic reaction is the formation of anhydrous oxide, in the presence of chloride, bromide and iodide ions, soluble aluminum salts are formed.

It is suggested that when aluminum, carrying its air-formed film, is immersed in a solution in the presence of oxygen, the film breaks down and a small corrosion current begins to flow. In the absence of chlorides and similar ions, film repair can take place and aluminum behavior is controlled by the relative rates of film repair and film breakdown. In the presence of chlorides, film repair does not occur and once corrosion has been initiated by film breakdown it proceeds swiftly. If initiation is suppressed, by saturating the solution with aluminum oxide, corrosion is inhibited.

Corrosion, aluminum, aqueous, salts, mechanism

1961 Met 102
Vol.19 PDL-40637

Haffer, Dieter, and Wilhelm Hofmann
FATIGUE TESTS ON TITANIUM (in German with English summary)
Materialprüfung 3:5-14 (January, 1961)

Titanium, fatigue, test, foreign

PDL-41856

Krulfeld, M. and M.C. Bloom (U.S. Naval Research Laboratory. Metallurgy Division)
CORROSION MECHANISMS (PROTECTIVE SPINEL FILMS ON STEEL—THEIR STABILIZATION TO DETERIORATION ON ROOM TEMPERATURE EXPOSURE TO AQUEOUS MEDIA)
Report of NRL Progress p. 46-48 (September 1961)

Steel, water, corrosion, iron oxide, film, corrosionproof, mechanism

PDL-41855

Cass, W.G.
CORROSION RESEARCH TRENDS IN THE U.S.S.R
Corrosion Technol. 8:309-311 (October 1961)

Corrosion, corrosionproofing, research, U.S.S.R., review

PDL-41798

Greene, N.D., C.R. Bishop, and M. Stern (Union Carbide Metals Co., Niagara Falls, N.Y.)
CORROSION AND ELECTROCHEMICAL BEHAVIOR OF CHROMIUM-NOBLE METAL ALLOYS
J. Electrochem. Soc. 108:836-841 (September 1961)

Chromium alloys, alloying agents, platinum, palladium, iridium, rhodium, ruthenium, osmium, corrosionproof, mechanism, measurement

1961 Misc 41
Vol.19 PDL-41924

Everett, D.H. (Bristol, Eng. University)
THE THERMODYNAMICS OF FROST DAMAGE TO POROUS SOLIDS
Trans. Faraday Soc. 57:1541-1551 (September 1961)

When a water-saturated material freezes, microscopic ice crystals form in the coarser pore spaces and water is withdrawn from the finer pores. Mechanical damage is associated with forming of ice crystals and not necessarily with the expansion of water upon freezing. The thermodynamics of the formation of 'ice lenses' is discussed in terms of the chemical potential of the crystal and of the bulk solid, using a model in which two cylinders, one containing ice, the other water, are connected by a capillary tube. At any temperature the pressure on the ice and the pressure on the water together with interfacial free energy, determine the shape of the ice lens and its growth in the tube.

It is found that the excess pressure which can build up in a coarse pore of radius R connected to a supply of water by a capillary (i.e., microscopic pore) of radius r is proportional to 1/r - 1/R. Mechanical failure occurs when this excess pressure exceeds the strength of the porous material, or in the case of soil, is greater than the pressure exerted at the freezing plane by the overburden. Liability to damage is decreased if the water is fed from a water table at a lower level than the freezing plane, or if the supply is limited. In view of this, frost heaving of roads may be lessened if the soil particles are uniform in size, and if the water table is not nearby.

Qualitatively the theory presented is in accordance with known facts, but a precise quantitative correlation is difficult because of the complexity of porous materials and of the lack of a reliable value for the surface tension of ice.

Freeze, solids, degradation, theory

1961
Vol.19

Misc 42
PDL-41826

Mauss, F., and H. Djavanmard (Institut Francais du pétrole, Paris)
COBALT-BASE ADDITIVES REDUCE SOOT EMISSION BY OIL-BURNING EQUIPMENT
Cobalt No. 11:21-27 (June 1961)

The addition of organic compounds of cobalt to fuel oils decreases the weight of combustion residues, independently of the operating conditions of the boiler. For a given weight of residue the cobalt additives allow the amount of excess air to be lowered, and consequently reduce the waste heat. Their use, however, scarcely changes the rate of fouling of exchanger surfaces in ordinary domestic boilers, and does not increase efficiency significantly. Cobalt additives do not catalyze the oxidation of sulfur dioxide to trioxide, and their use presents no risk of increasing corrosion of domestic heating equipment.

A comparison of various commercial and laboratory prepared additives (usually used in a concentration of 1/50,000 cobalt) shows activities of about the same order. Exceptions are nonylphenate monosulfide and disulfide, and acetylacetonate with activities about 20% higher and one commercial naphthenate with slightly lower activity.

Oils, fuel, depositproofing, cobalt compounds(organic)

PDL-37986

Zewe, E., F. Rumler, R. Herbolsheimer, and G. Wolf
RECORDING OF AIR POLLUTION MEASUREMENTS (in German with English summary)
Staub 20:37-40 (February 1960)

Air, contaminants, measurement, data processing, foreign

1961
Vol.19

Misc 43
PDL-41187

Rider, D.K. (Bell Telephone System, New York, N.Y.)
TEMPERATURE RISE IN STRUCTURES DUE TO SOLAR HEATING
Am. Soc. Testing Materials, Spec. Tech. Publ. No. 270:43-60 (1959)

Studies on solar heating in roof and building constructions, in aircraft structures, in sandwich panels, and in radome, antenna and small transformer housings are reviewed. Temperatures within and on the surface of these structures depend on the amount of exposed surface, orientation, location, absorptivity and emissivity, and wind velocity relative to the surface.

Peak temperatures for high solar absorptivity surfaces (black, dark blue, dark green, dark brown, olive drab) may reach 200, 230, 260 F for ambient temperatures of 110, 125, 135 F, respectively. Comparable values for moderate absorptivity surfaces (rough or oxidized metals, most natural nonmetals, medium colors) are 160, 180, 215 F; for aluminum 150, 165, 200 F; for white smooth surfaces, 125, 140, 155 F; for shielded surfaces, 115, 130, 140 F.

For service in the United States, the maximum ambient temperature may be assumed to be 125 F. In the hottest desert regions, the temperature may rise to about 110 F during 75% of the summer days, and may exceed 120 F on about 6 days during the hottest month. For commercial service outside of the southwest deserts and central plains, a temperature of 98 to 100 F probably will not be exceeded more than 5% of the summer daylight hours. Peak temperatures of about 2 hr duration are attained about 3 hr after solar noon. Peak intensity during hottest days may rise to 360 Btu/sq ft/hr at solar noon, and remain near this level up to 4 hr.

Solar heating can be minimized by: (1) orientation of the exposed surface to avoid direct and indirect solar radiation and reflection and radiation from nearby surfaces; (2) interposing an opaque reflecting barrier between the source and the surface; (3) using surface materials of low absorptivity in the visible and near-infrared portions of the spectrum and of high emissivity at 8 and 9 μ; (4) adding heavy thermal insulation, and

(5) using heat exchangers, natural or forced air circulation or water cooling.

Structures, solar radiation, temperature

PDL-41282

National Academy of Sciences. National Research Council
SCIENCE IN ANTARCTICA. PART I. THE LIFE SCIENCES IN ANTARCTICA
Publication 839 (1961) 162 p.

Antarctic, algae, microorganisms, bacteria, fish, insects, birds, vegetation, research program, review

PDL-41283

National Academy of Sciences. National Research Council
SCIENCE IN ANTARCTICA. PART II. THE PHYSICAL SCIENCES IN ANTARCTICA
Publication 878 (1961) 131 p.

Antarctic, meteorology, oceanography, glaciology, earth science, research program, review

PDL-41297

WATER-VAPOR TRANSMISSION TESTING
Materials Research and Standards 1:117-121 (February 1961)

Water vapor, permeability, tests

PDL-41329

U.S. Armed Services Technical Information Agency
MAINTENANCE AND MAINTAINABILITY. AN ASTIA REPORT BIBLIOGRAPHY
ASTIA Doc. 247300 (November 1960) 69 p.

Armed Forces, equipment, maintenance, summary, bibliography

Deterioration
NRC

1961 Plas 63
Vol.19 PDL-37424

Coover, H.W., Jr., R.L. McConnell, G.C. Newland and J.W. Tamblyn (Tennessee Eastman Co., Kingsport, Tenn.)
A NEW WEATHERING STABILIZER FOR POLY(VINYL CHLORIDE) PLASTIC
Plastics Technol. 6:45-47, 56 (August 1960)

Hexamethylphosphoric triamide (HPT) is the best single additive for poly(vinyl chloride) by ultraviolet light. It increases the color of the plastic during compounding but on exposure to sunlight, this color disappears rapidly. After 7 yr outdoor weathering no appreciable color develops except for a few small yellow-brown spots appearing in the 7th year. Some internal haze forms gradually but no surface cracks develop. One year tests indicate that addition of both HPT and a heat stabilizer may offer a satisfactory compromise between heat and light stability. A recommended formulation is 100 parts of PVC, 30 parts dioctyl phthalate, 2 parts HPT, 1 part epoxy stabilizer, and 1 part organotin-sulfur stabilizer.

The mechanism by which HPT prevents discoloration by light remains obscure. It has a strong affinity for hydrogen chloride, but lacks the heat stabilizing action common to most hydrogen chloride absorbers. It does not act as an absorbent for solar ultraviolet. The stabilizing action may be analogous to that of antirads which protect plastics against high energy radiation without absorbing directly any large fraction of the incident radiations themselves.

Vinyl chloride, polymers, lightproofer

PDL-41870

Minnesota Mining and Manufacturing Co., St. Paul, Minn. Central Research Dept. (G.H. Crawford and D.E. Rice)
ARCTIC RUBBER
U.S. Dept. of the Army. Contract DA-19-129-QM-1684, Quarterly Progress Report 4 (May-August 1961) 15 p.

Elastomer, fluorocarbon, nitroso compound, temperature-proof, cold, synthesis, progress report
Deterioration
NRC

1961 Plas 64
Vol.19 PDL-41519

Cook, A.S.
THE SHORT-TERM PRESERVATION OF NATURAL LATEX
J. Rubber Research Inst. Malaya 16:65-86 (1960)

The preservative effect on various types of natural rubber latex of alkalis, sequestering agents, bactericides and combinations of these are discussed. Formaldehyde was the most effective single chemical; at a level of 0.05% it maintained many latices in liquid condition for 2-3 days. The pH was not affected and no extra acid was required for production of dry rubber by acid coagulation. Preservation was influenced by the type of latex, by weather and other ecological conditions, and especially by wintering of the trees.

The quantities of sodium sulfite, sodium metasulfite, ammonia and formaldehyde required for effective preservation (for smoked sheet production) of latex up to 6 pm on the day of tapping were determined. Formaldehyde appeared to be the most useful. For the production of sheet from latex preserved for 24 hrs, 0.05% formaldehyde plus 0.1% sodium metasilicate was the cheapest and most effective combination.

Rubber, latex, bacteria, toxic

PDL-40000

Reumuth, H., and Th. Loske (Fraunhofer-Institut für Angewandte Mikroskopie, Photographie and Kinematographie, Mannheim, Ger.)
ATTACK BY MOTHS OF CELLULOSE, FILMS AND BAGS OF 'MOTHPROOF' PLASTICS
Melliand Textilber. 41:871-873 (July 1960)

In their search for digestible materials, moths can chew through 'mothproof' films. Undigested nonkeratinous material has been found in and expelled at the end of the intestinal tract of moths. Cellophane and polyethylene used for mothproof wrappings were attacked and the materials inside destroyed. Microphotographs

show the types of bites, and from these the variety of moth or other insects causing attack may be identified.

Moths, insects, cellophane, polyethylene, films, polymers

PDL-41439

Pöge, W.
ATTACK ON POLYVINYL ACETATE DISPERSIONS BY MOLDS AND ITS SUPPRESSION (in German with English summary)
Plaste u. Kautschuk 8:74-76 (February 1961)

Poly(vinyl acetate) dispersions, even without addition of foreign substances, are attacked in some instances by fungi after protracted storage. Pure films show no signs of fungus growth but they do not resist it when used as coatings on substrates susceptible to growth. Dibutyl phthalate used as plastizer does not influence mold growth either favorably or unfavorably. Tributyltin hydroxide, chloroacetamide, and sodium fluosilicate are effective fungistats.

Vinyl acetate, polymers, fungi, toxics, tin compounds (organic), fluosilicate, chloroacetamide

PDL-39566

Konishi, Akio
COLOR CHANGE OF POLYVINYLCHLORIDE IN THERMAL DEGRADATION (in Japanese)
Nippon Kagaku Zasshi 78:1517-1521 (October 1957)

Poly(vinyl chloride), discoloration, decomposition, temperature, temperatureproofer, foreign

1961
Vol. 19

Plas 66
PDL-39461

Gysling, H., and H.J. Heller (J.R. Geigy A.-G., Basel, Switz.)
UV ABSORBERS AS STABILIZERS FOR PLASTICS (in German with English translation)
Kunststoffe 51:13-17 (January 1961)

Only three classes of ultraviolet absorbers are used industrially for stabilizing plastics. Salicylates (phenyl salicylate and tert-butylphenl salicylate) are compatible with most plastics but absorb predominantly in the short wave region up to about 350 mμ. Benzophenones cover most of the ultraviolet range from 290 to 420 mμ. The most commonly used benzophenones are 2,4-dihydroxy-, 2-hydroxy-4-methoxy-, 2,2'-dihydroxy-4-methoxy- and 2,2', 4,4'-tetrahydroxy. A third and new class of absorbers are the (hydroxyphenyl) benzotriazoles. The first commercially available compound of this type is Tinuvin P (an alkyl derivative) which has high absorption power, a steep slope absorption curve and excellent light fastness. Absorption properties are best in glass-clear colorless plastics, particularly polymethacrylates and polystyrene.

Polymers, lightproofers, foreign

PDL-41440

Dubois, P. (Conservatoire national des arts et métiers, Paris)
SLOW CORROSION OF PLASTICS (in French)
Corrosion et Anticorrosion 9:145-159 (May 1961)

Internal and external factors causing slow corrosion of plastic products used for protecting metal surfaces and for packaging corrosive materials are reviewed and accelerated corrosion test methods and instruments are described. Some recent experimental data on the corrosion resistance of plastics also are presented.

Internal corrosion factors include the composition of the plastic, its structure, the nature of its chemical bonds and internal strains. Important external factors include the action of light and heat,

chemical agents, and mechanical stresses. The effects of composition are evidenced by the role played in corrosion by various additives, such as plasticizers, fillers, and stabilizers. Structural characteristics, such as degree of crystallinity, copolymerization, and cross-linking affect the permeability of polymers to various corrosive agents. Generally, crystalline polymers are more corrosion resistant than amorphous polymers. Branched chains and crosslinks often increase corrosion resistance. The strength of the chain and intermolecular bonds determines relative resistance to depolymerization, e.g., a primary carbon bond is generally stronger than a tertiary one. Hydrogen bonding in crystalline zones increases resistance to chain rupture. Internal strains such as occur in thermoplastics due to temperature and pressure gradients, as well as 'weak points' in the macrostructure, such as entrapped air microbubbles, favor degradation. Degradation, essentially due to internal factors, is usually triggered by external agents. For example, polymers containing carbonyl groups are susceptible to ultraviolet light. A warm and humid environment favors the development of molds or attack by insects. A thermal shock can cause a sudden rupture. Oxygen, water vapor, and industrial air pollutants are among the important chemical agents causing corrosion. Electric current can cause corrosion by its thermal effects.

Accelerated corrosion tests consist either in subjecting the material to the active agents at higher than normal intensity increasing the frequency of action, making the action of a normal agent continous rather than intermittent, applying abnormal stresses, or applying simultaneously two or more different stresses. The evaluation of resistance is usually based on changes in elasticity and resistance to rupture or bending. Results of accelerated corrosion tests, presented in the form of graphs and tables, give the relative resistance to various chemical agents, heat, and mechanical stresses of cellulosic plastics, formaldehyde resins, polyamides, synthetic rubbers, polyesters, and acrylic resins. Brief descriptions and diagrams are given of test instruments, including the Rolland-Sorin elastometer, a torsion-type elastometer, and the Dynstat tensile strength meter.

Polymers, decomposition, corrosion, mechanism, tests, review, foreign

Deterioration

NRC

1961 Plas 68
Vol.19 PDL-41643

U.S. Arsenal, Watertown, Mass. Laboratories (A.W. Schultz, and A.K. Wong)
THERMAL CONDUCTIVITY OF TEFLON, KEL-F, AND DUROID 5600 AT ELEVATED TEMPERATURES
Technical Report WAL TR 397/10;...ASTIA Doc. 154351 (March 1958) 20 p.

The thermal conductivity values of dimensionally stable (annealed) commercial quality specimens of Teflon, Kel-F, and Duroid 5600 (an inorganic fiber-reinforced Teflon base material) were determined at mean specimen temperatures ranging from approximately 185 F to their respective gel points (620 F, 414 F and approximately 620 F). A comparative method based on unidirectional steady-state heat-flow theory was used.

Thermal conductivities increased with increasing temperatures. Teflon consistently exhibited higher values than Kel-F and lower values than Duroid 5600. Teflon increased from approximately 1.84 Btu/hr/sq ft/^{o}F/in. at room temperature (70 F) to 2.80 at 570.4 F; similarly, Kel-F conductivity increased from 0.70 at 70 F to 1.72 at 375.8 F; Duroid 5600 values increased from 2.80 to 3.99 at 537.5 F. At 350 F, respective values of Teflon, Kel-F and Duroid 5600 were 2.37, 1.72 and 3.58.

Conductivity, Teflon, Kel-F, fluorocarbons, high temperature

PDL-41633

Hueck-van der Plas, E.H.
BIOLOGICAL DETERIORATION OF PLASTICIZERS IN PVC (in Dutch)
Plastica 13:1216-1219 (December 1960)

Vinyl chloride, polymer, plasticizer, microorganisms, fungi, decomposition, foreign

1961 Plas 69
Vol.19 PDL-41833

Teeter, H.M., J.C. Cowan, L.E. Gast, W.J. Yurgen and R.A. Clark
SAFFLOWER OIL ADDUCTS AS PLASTICIZERS
J. Am. Oil Chemists' Soc. 38:117-120 (March 1961)

Eleven esters and epoxides of adducts of conjugated linoleic acid with maleic and acrylic acids, and eight esters and epoxides of adducts of vegetable oils with acrylic and maleic esters were evaluated as plasticizers for poly(vinyl chloride) (PVC), acrylonitrile rubber, and poly(vinylidine chloride) (PVDC), and in PVC plastisols.

With PVC and PVC plastisols, the dimethyl ester of the acrylic adduct of linoleic acid and its epoxide were the most promising, comparing favorably with the controls bis(2-ethylhexyl phthalate and isoctyl epoxystearate). With PVDC, however, these adducts had a slight adverse effect on color stability. The vegetable oil adduct esters and epoxides were incompatible with PVC but highly compatible with acrylonitrile rubber. In general, they performed like the petroleum type of plasticizers but were less volatile and less easily extractable.

Plasticizers, vinyl chloride, acrylonitrile, polymers, elastomers

PDL-41866

U.S. Forest Service. Forest Products Laboratory, Madison, Wis. (G.H. Stevens)
FATIGUE TEST OF PHENOLIC LAMINATE AT HIGH STRESS LEVELS AND ELEVATED TEMPERATURES
Report 1884 (August 1961) 18 p.

Unnotched specimens of representative laminates of CTL-91LD phenolic resin and 181-A1100 glass fabric were fatigue tested at about 5 cycles per min with axial loads applied parallel to the warp direction and at zero mean stress. The tests were made on a constant-load type machine at high stress levels at 73, 400, 500, 600, and 800 F. Starting with the average value indicated by

the static control test, the load was progressively lowered until the specimen could withstand the established load for about 200 cycles before failure.

With few exceptions, specimens failed in that portion of the cycle, either in tension or compression, that showed the least strength in the static control test. At 73 F, fatigue strength at 200 cycles was about 80% of the control strength. At elevated temperatures, fatigue strength was essentially constant up to about 150 cycles, a reflection of the complex strength-time-temperature relationships. Permanent degradation effect due to time at temperature were noted at 800 F after about 150 cycles.

Difficulties experienced in devising test techniques are discussed. It is emphasized that, in addition to temperature, rate of heating and time at temperature are important factors in the fatigue resistance of such laminates.

Laminates, phenolic, polymers, glass, fatigue, stress, high temperature

PDL-41864

INSULATED ARCTIC COMBAT BOOT WITHSTANDS COLD TO — 102°
Leather and Shoes 139(21):10 (May 1960)

A new white insulated rubber combat boot makes use of the vapor barrier principle to protect the wearer against extreme dry cold. Three layers of wool fleece are sealed in the upper and two layers of felt in the midsole between inner and outer rubber layers. The seal prevents sweat and outside moisture from destroying the insulating properties. A self-closing air-release valve may be used to equalize air pressure building up inside the insulation when the boot is worn at high altitudes. The boot can be worn with only one pair of socks and weighs 2 lbs less than other Arctic boots. It is more durable and repairable. Cost is only $12.

Footwear, low temperature, design

1961
Vol.19

Plas 71
PDL-41869

U.S. Naval Shipyard, Brooklyn, N.Y. Material Laboratory (C.K. Chatten)
RELATIONSHIPS BETWEEN CAVITATION EROSION RESISTANCE AND OTHER MECHANICAL PROPERTIES OF POLYSILOXANES
Laboratory Project 4759-14, Progress Report 9 (September 1961) 11 p.

None of four commercial room temperature vulcanizing polysiloxanes showed appreciable resistance to cavitation erosion under test conditions of 3250 rpm and 15 psig on a rotating disk. Tensile strength, ultimate elongation and tear strength properties were considerably lower than those of neoprene and urethan elastomers, both of which have high resistance to cavitation erosion. Mechanical properties, equal or superior to those of the neoprene and urethan elastomers, are required for optimum cavitation erosion resistance of a coating. Data on mechanical properties of the siloxanes are presented together with microphotographs showing the nature of the surface damage.

Siloxanes, polymers, cavitation, mechanical properties

PDL-37031

Thinius, K., and J. Schreiber (Institut für Chemie und Tehnologie der Plasten, Leipsig, Ger.)
AGING OF PLASTICS. EFFECTIVENESS OF PLASTICIZERS IN LIGHT AND WEATHERING EXPOSURE OF PLASTICS
Plaste u. Kautschuk 6:169-174 (April 1959)

Polymers, vinyl chloride, lightproofers, weatherproofers, plasticizers, foreign

PDL-37726

Wolkowa, W.L.
INHIBITING THE AGING OF BITUMEN (in German)
Bitumen, Teere, Asphalte, Peche 10:298 (August 1959)

Bitumens, oxidationproofer, foreign

1961 Plas 72
Vol.19 PDL-41727

Borden Co. Chemical Division (B.D. Halpern and J. Dickstein)
STUDY LEADING TO THE DEVELOPMENT OF HIGH TEMPERATURE RESISTANT ADHESIVES
Quarterly Report (September-December 1960)...ASTIA Doc. 253989 15 p.

Adhesives, temperatureproof, polymers, triazines, phenylene, synthesis, tests, progress report

PDL-37324

Miller, S.A., and V.A. Chase (Brunswick-Balke-Collender Co., Chicago, Ill.)
NEW EPOXIES-1. EPOXY RESIN IS STRONG AT 500 F PLUS
Materials in Design Eng. 51:17-19 (April 1960)

Epoxy, polymers, heatproof

PDL-37321

NEW EPOXIES-2. FAMILY OF EPOXIES IS LIGHT, STRONG, HEAT RESISTANT
Materials in Design Eng. 51:19-20, 189-190, 192 (April 1960)

Epoxy, polymers, heatproof

PDL-41763

Chenicek, Joseph A., and William L. Cox (to Universal Oil Products Co.)
PRODUCTION OF A CONCENTRATE OF DIMETHYL ETHERS OF 5-ALKYLPYROGALLOLS
U.S. Pat. 2,964,569; December 13, 1960. 4 p.

Patent, ozoneproofer, discolorationproof, rubber, synthesis

1961 Text 27
Vol.19 PDL-41689

Krasil'nikov, N.A., R.A. Zhukova, and V.B. Yashish
(Academy of Sciences of the USSR. Institute of Microbiology)

ON THE USE OF ANTIBIOTICS FOR PROTECTING FIBROUS EXTERIORS OF UNDERGROUND POWER CABLES FROM DESTRUCTION BY MICROORGANISMS

Microbiology 29:324-326 (November/December 1960)

Filter paper and cotton thread were saturated with culture fluids of sporogenous bacteria or fungi antagonistic to cellulose decomposing organisms or with solutions of various antibiotics. The specimens were dried, placed on agar media, moistened with nutrient media, inoculated with Vibrio vulgaris, Sorangium cellulosum, Sporocytophaga myxococcoides, and Trichoderma lignorum, and incubated at 27 C. Growth of the microorganisms was noted, and loss of tensile strength of thread was determined. In similar tests under anaerobic conditions, treated thread was immersed in nutrient medium previously inoculated with an enriched culture of anaerobic thermophilic bacteria.

After 30 days, untreated controls were completely decomposed by the aerobes, while threads treated with Bacillus mesentericus 2699 culture fluid lost $\leq 40\%$ original tensile strength. There was no growth of cellulolytic bacteria on paper or cotton treated with culture fluids of Actinomyces lavendulae 4033, A. rimosus, and A. fluorescens 2292 and 592. Against anaerobic thermophils, similarly treated cotton retained its original strength for 10 days while untreated thread was destroyed in 3 to 4 days. As determined by the dilution method in meat-peptone broth, the titers of antibacterial activity in culture fluids from the most inhibitive organisms, A. fluorescens 2292, A. rimosus, A. fluorescens 592, and A. lavendulae 4033 toward Staphylococcus aureus were 730, 730, 250 and 250 units, respectively

The antibiotics tested were more effective against the aerobes than the anaerobes. There was no growth in 30 days of S. myxococcoides on treated paper; Sorangium cellulosum and T. lignorum grew only on paper treated

with antibiotic No. 108. Against thermophils cotton was protected to varying degrees: grisemin and penicillin delayed strength loss by only 2 to 3 days; cotton treated with streptomycin, terramycin, virusin 1609, and antibiotic No. 108 was decomposed in 10 days; biomycin preserved the original strength for 15 days, whereas untreated thread decomposed in 3 to 4 days.

In soil tests, cotton specimens were buried 10 cm deep in chernozem at 60% moisture and 20 C. Untreated cotton lost 100% original strength in 15 days; cotton treated with actinomycete culture fluid or biomycin, in 30 days. Most effective against soil microorganisms was culture fluid of A. rimosus.

Cable, wrapping, cotton, paper, underground, toxic, antibiotics

PDL-35938

Nitschke, Gerd
VARIATIONS OF SOME IMPORTANT MECHANICAL-TECHNOLOGICAL PROPERTIES OF UNTREATED AND CHEMICALLY TREATED WOOL BY HUMIDITY (in German with English summary)
Faserforsch. u. Textiltech. 9:217-226 (June 1958)

Wool, chemutation, humidity, mechanical properties, tensile properties, foreign

PDL-38367

Jörder, H., and Vinh-Am
FASTNESS OF DYED TEXTILES ON EXPOSURE TO DAYLIGHT IN THE FADE-OMETER AND THE XENOTEST (in German)
Z. ges. Textil-Ind. 61:305-308 (April 1959)

Textiles, dyes, discolorationproof, tests, for-ign

1961 Text 29
Vol.19 PDL-41853

St. Mard, Hubert H., Carl Hamalainen and Albert S. Cooper, Jr. (U.S. Agricultural Research Service. Southern Regional Research Laboratory, New Orleans, La.)

PREPARATION AND PROPERTIES OF FIBROUS PARTIAL ISOBUTYRATES OF CELLULOSE

Am. Dyestuff Reptr. 50:796-800 (October 1961)

Partial isobutyrylation of scoured cotton yarn and fabric without destroying fibrous structure was accomplished by a base-catalyzed esterification process. Greatest activation of the cotton (required to promote esterification to any appreciable degree of substitution) was achieved by swelling in anhydrous ethylamine. An effective and more practical method was mercerizing in 23% sodium hydroxide solution, followed by water washing and dehydration by solvent interchange; pyridine was most effective as the exchange solvent and as the anhydride diluent. Exchange by acetone followed by one pyridine exchange also was effective. The reagent giving the highest substitution was a 1:1 by volume mixture of anhydride and pyridine containing 2% potassium isobutyrate as catalyst. Substitution was highest in a yarn sample activated with ethylamine and reacted 6.5 hr in refluxing anhydride-pyridine mixture; ixobutyrl content was 54.1%, equivalent to 2.65 substitution. The presence of isobutyric acid seemed to inhibit esterification; a method of effectively reducing or removing this acid is required to make the process practicable.

Evaulation tests data on partially isobutyrylated fabric show that this ester retains most of the excellent textile properties of cotton and has physical properties about equal, and in some cases superior, to those of other cellulose esters. Outdoor weathering resistance, however, is poor; no measurable strength was retained after 5.5 mo exposure, whereas untreated controls retained 66% original strength. Rot resistance is excellent, with no loss of strength after 48 wk soil burial.

Cotton, chemutation

Deterioration
NRC

1961 Text 30
Vol.19 PDL-41639

Rochas, P., and S. Pierret
DETERMINATION OF ALKALI SOLUBILITY OF SILK ACCORDING TO THE METHOD OF OKU AND SHIMIZU (in French with English summary)
Inst. textile France, bull. No. 92:101-106 (January-February 1961)

Earlier work established that photochemical, thermal, and chemical changes of silk can be differentiated by determining the tensile strength (breaking load and elongation at break), fluidity, and alkali solubility of fibers. In all cases, tensile strength is reduced and fluidity is increased. Soda loss increases markedly as a result of thermal or photochemical degradation, but remains unchanged in silk degraded by the action of alkali, and increases only slightly as a result of degradation by acids.

Present tests were carried out on samples of raw and scoured silk exposed to bacterial attack by 1-mo soil burial and to attack by molds by the standard method, AFNOR X 41.503. In all samples, a moderate degree of biological degradation resulted in a significant loss of tensile strength, but had no effect on the fluidity or alkali solubility of silk. Thus, these tests can be used to distinguish between degradation caused by the action of light heat, or chemical agents, and that caused by microorganisms. The behavior of silk degraded by mechanical factors is similar to that of silk attacked by microorganisms. However, mechanical damage can be easily established by a simple microscopic examination. The fact that biological degradation does not affect the fluidity or the alkali solubility suggests that microorganism action is localized in certain areas of the fiber, causing alteration of microfibrils without affecting the average length of the macromolecular chains. Obviously, a generalized and extensive microbial degradation will affect all chemical, physical, and mechanical properties of the fibers. In such cases, however, the nature of the degradation can be established by microscopic examination of the samples.

Textiles, silk, bacteria, fungi
Deterioration
NRC

1961 Text 31
Vol.19 PDL-41248

Strobel, A.F. (General Aniline and Film Corp., New York, N.Y. Antara Chemicals Division)
IMPROVEMENT OF LIGHTFASTNESS OF DYEINGS ON SYNTHETIC FIBERS BY ULTRAVIOLET ABSORBERS. PART I
Am. Dyestuff Reptr. 50(16):583-588 (August 1961)

Five ultraviolet absorbers covering the UV range from 300 to 400 mμ, applied to nylon, Dacron and Orlon by co-dyeing, were compared for dyeing affinity, exhaustion and ability to prevent dye fading for 20 hr in a Fade-Ometer. Three of the absorbers were new substituted acylonitrile compounds; the other two were Uvinul D-49 (50/345 mμ) and Uvinul M-40. A wide range of level-dyeing dyes were used, applied by various methods using 0.25% dye and 0.25% of absorber of which about 50% was exhausted. In almost all cases the near-UV absorbers proved more effective than the far-UV absorbers in color stabilization.

Lightproofers, ultraviolet, dyes, Nylon, Orlon, Dacron

PDL-41114

Ernst, W., and M. Sorkin
TESTING OF BACTERIOSTATIC FABRICS (in German)
Textil-Rundschau 15:233-28 (May 1960)

Textiles, bacteria, toxic, tests, foreign

PDL-37703

Nishi, Hisami
STUDIES ON THE PREVENTION OF YELLOWING AND DETERIORATION IN SILK. VI. ON THE ACTION OF THIOUREA RESIN ON THE YELLOWING AND THE DETERIORATION OF SILK IN HUMID ATMOSPHERES (in Japanese)
Nippon Sanshigaku Zasshi 27:269-272 (August 1958)

Silk, discolorationproofing, tensile properties, tendering, humidity, thiourea, polymers, foreign

1961
Vol.19

Text 32
PDL-40550

Bubser, W.
COMPARISON OF INSTRUMENTS FOR LIGHT- AND WEATHER-EXPOSURE TESTS (in German with English summary)
Melliand Textilber. 41:1413-1416 (November 1960)

Tests, test equipment, light, weathering, accelerated, comparison, textiles, foreign

PDL-41786

Harris Research Laboratories, Inc. (Charles A. Rader and Anthony M. Schwartz)
ACCELERATED DETERIORATION OF TEXTILES
ASTIA Doc. 257960 (June 1961) 6 p.

Progress report, textile, cellulose, oxidation, hydrolysis, catalysis, light, degradation, cellophane, tests, accelerated

PDL-41761

Klein, Elias, David J. Stanonis, and Pieter Harbrink (to the Secretary of Agriculture)
PRODUCTION OF STRONG, ROT-RESISTANT BENZYL CELLULOSE FIBERS
U.S. Pat. 2,990,234; June 27, 1961. 3 p.

Patent, cellulose, chemutation, fungi, benzyl chloride

PDL-35797
35798

Himmelreich, Werner
DETERMINING THE FIBER DAMAGE OF POLYAMIDE FABRICS BY VISCOMETRIC DETERMINATION OF THE AVERAGE DEGREE OF POLYMERIZATION (in German)
Deut. Textiltech. 9:153-155 (March 1959); 213-218 (April 1959)

Textile, fibers, polyamide, polymerization, degradation, test, technique, foreign

1961 Wood 63
Vol.19 PDL-39785

Davenport, J.C., and R.V. Mirams (New Zealand Forest Products Ltd., Auckland)
THE PRESERVATIVE TREATMENT OF PINUS RADIATA TIMBER BY PRESSURE IMPREGNATION
New Zealand J. Sci.3(3):453-467 (September 1960)

Air or kiln dried Pinus radiata timber was treated to refusal with Celcure by a full cell vacuum-pressure-vacuum cycle at atmospheric temperature. Treatment was carried out at two plants, one using a maximum pressure of 100 psi, the other 275 psi. Salt retentions were determined from weight increase and volume of each stick and from chemical analysis of a clear sample from the mid length of each stick. In evaluating the results use was made of the core to cross sectional loading relationship.

The pattern of treatment between the two plants was similar despite different operating conditions. Significant correlations were found between solution absorption and wood moisture content both in respect to the charge and to the individual stick variations, and between solution absorption and basic density of the individual sticks within a charge. Complete penetrations with very uniform distribution of preservative was, however, achieved in all cases. Control of the salt loading could be maintained by the adjustment of preservative solution concentration.

Wood, pine, toxic, Celcure

PDL-37030

Kollmann, Franz, and Adolf Schneider (Munich. University)
MEASURING SORPTION ON WOODS IMPREGNATED WITH PROTECTIVE SALTS (in German with English summary)
Holz Roh- u. Werkstoff 17:212-218 (May 1959)

Wood, spruce, sorption, toxics, aqueous, foreign

1961 Wood 64
Vol.19 PDL-41547

Stamm, Alfred J. (North Carolina. University. State College of Agriculture and Engineering) and Jerry N. Beasley (Meade Corp. Chillicothe, Ohio)
DIMENSIONAL STABILIZATION OF PAPER BY ACETYLATION
Tappi 44:271-275 (April 1961)

Unbleached and bleached kraft saturating paper, 85 gm sq/m., were acetylated at 100 and 120 C for 10 min to 3 hr with acetic anhydride using four different catalysts; namely, 0.5 and 1.0% of the weight of the paper of zinc chloride, a mixture of 10% sodium acetate and 10% potassium acetate, and a volume of pyridine equal to that of acetic anhydride used. Reductions in swelling values, from equilibrium with 50% RH to soaking in water, range from 48 to 89%. The use of 0.5% zinc chloride as catalyst gives the best all-around strength properties of the catalysts tried.

Burst, tear factor, breaking length of the dry unbleached paper are not materially reduced by treatments that give reductions in swelling of less than 60%. Losses in strength of the bleached paper, however, are appreciable with treatments that give somewhat less reduction in swelling. Folding endurance is still more adversely affected by the treatments. Wet breaking length values are considerably increased at the higher levels of dimensional stabilization with both papers.

Properties of unbleached kraft stabilized by acetylation are compared with paper stabilized by cross linking with formaldehyde or by heat treatment using zinc chloride, formic acid or sodium hydroxide as catalysts.

Paper, dimensionproofing, chemutation, acetylation

1961 Wood 65
Vol.19 PDL-41518

Cockcroft, R. (Gt. Brit. Forest Products Research Laboratory, Princes Risborough, Eng.)
A NEW METHOD FOR DETECTING THE PRESENCE AND DEPTH OF PENETRATION OF BORON IN TREATED TIMBER (in English)
Holzforschung 14:117-119 (1960)

The presence of a boron-containing preservative in wood can be determined by spraying a cross section of the wood first with a 1% (wt/vol) aqueous solution of poly(vinyl alcohol) diluted with an equal volume of 10% hydrochloric acid and then with a 0.1 N iodine solution. In the presence of boron a dark blue or blue-green color appears immediately. The test is sensitive to a loading as low as 0.15 lb/cu ft expressed as boric acid. Starch which would also give a positive test is not present in soft woods which make up the bulk of woods treated with boron compounds; in sapwood of hardwoods starch is present only in rays and parenchma and blue color is much less intense than when boron compounds are present. Unlike the turmeric test the wood samples used in the poly(vinyl alcohol)-iodine test need not be dried.

Wood, toxic, boron compounds, analysis

PDL-40732

THE ACTION OF ELEVATED TEMPERATURES ON PAPER (in German)
Allgem. Papier-Rundschau No. 10:550-551 (May 1960)

Strips of kraft paper were heated in a drying oven at various temperatures. Paper containing 10% moisture at 20 C contained 1.7% after drying to equilibrium at 70 C, and 0% after 12 hr at 110 C. Breaking strength was 7.8 kg at 20 C, reached a maximum of 9.0 kg after 1 hr at between 50 and 70 C and fell to 8.6 after 1 hr at 130 C. Elongation was 2.8% at 20 C; 1.5% after 1 hr at 70 and 1.3% after 1 hr at 130 C. Losses in strength and elongation of paper heated for 3 hr at 120 C were restored to original values by holding for 24 hr at 20 C.

Paper, mechanical properties, high temperature

Deterioration
NRC

1961 Wood 66
Vol.19 PDL-41842

Jacquiot, C., M. Breuzard, J. Guillemain and D. Lapetite
BORIC ACID AND BORATES AS WOOD PRESERVATIVES (in French with English summary)
Rev. path. végétale et entomol. agr. France 39:181-195 (October-December 1960)

The efficiency of boron compounds as wood preservatives against wood-rotting fungi, blue stain fungi, and Lyctus brunneus Steph and Hylotrupes bajulus L was determined.

A concentration of 0.2% boric acid in dry wood prevents attack by Polystictus versi color and Trametes trabea. The threshold for Gyrophana lacrymans lies below 0.37% leaching as much as 80% of the preservative diffuses away in 4 mo, boron compounds are unsuitable for wood preservation in exposed sites. In building interiors at least 1% should be used. Boron compounds are not effective again blue stain fungi even when wood is soaked for 45 sec in a 20% pentaborate solution.

The threshold against Lyctus brunneus attack on obeche (Triplochiton sideroxylon) was 0.3%. No insects survived after 3 to 6 mo in Scots pine sapwood containing 0.77% boric acid; a 1% concentration affords reliable protection. Because of their high leachability boron compounds should not be used for wood in contact with wet masonry. Their lack of toxicity makes them useful for preservation of wood in contact with food.

Wood, toxics, boron compounds, foreign

PDL-39918

McMahon, E.P. (Nickey Brothers, Inc., Memphis, Tenn.)
APPLYING CUMULATIVE FREQUENCY DISTRIBUTION IN MOISTURE CONTROL DURING KILN DRYING
Forest Products J. 11:133-3 (March 1961)

Wood, seasoning, water content, data processing

1961 Wood 67
Vol.19 PDL-41524

Hatfield, Ira (Wood Treating Chemicals Co., St. Louis, Mo.)
PREVENTIVE MAINTENANCE FOR STANDING POLES
Wood Preserving News 39:10, 12, 22-23 (August 1961)

Preventive maintenance for standing poles starts with choice of design, species and proper handling along the production lines. Preservative treatment must be sufficient to prevent deterioration by decay organisms, insects (mainly termites and carpenter ants) and woodpeckers after the wood has undergone proper seasoning. Poles may be damaged by fire, lightning, weathering (particularly by leaching of preservatives by rain and by loads imposed by heavy icing), and improper storage yard handling.

During the lifetime of a pole, regular inspection should include above and below ground checks, moisture readings, sound tests, check for splits, checks, holes, decayed areas and fiber breakage around knots, and boring of areas to determine extent of internal damage. If sufficient sound wood remains, in-place treatment may include spraying of preservative solution above ground, pole caps, and ground line treatment by encircling the pole with a band of preservative paste or grease from 2 to 12 in. above ground and 12 to 20 in. below grade.

Wood, poles, toxics, maintenance, review

PDL-38195

Tewari, M.C. (Dehra Dunn, India. Forest Research Institute)
EFFECT OF SPECIES ON THE FIXATION OF WOOD PRESERVATIVE CHEMICALS IN TIMBER
J. Timber Dryers' & Preservers' Assoc. of India 6(2):28-32 (April 1960)

Blocks of various wood species were impregnated with aqueous solutions of 3.02% copper sulfate, 3.18% zinc chloride or 5.74% chromated zinc chloride. With chromated zinc chloride resistance to leaching (at 30 to 33 C) increased considerably after 3 wk air drying (24.5 to 35 C and 52% RH) as compared with 1 wk. Leaching after 3 wk

drying was less than 1% in most species and only traces in sal and mango. Both zinc chloride and copper sulfate leached out more than 5% even after the longer period of drying and, therefore, are considered unsuitable for timber to be used in the open. The influence of wood species is shown by the better fixation of zinc chloride in the presence of dichromate in chir, sal and teak than in deodar, semul and mango.

Wood, exotic, toxic, aqueous, leaching

PDL-39107

Whaley, A.G. (Albert E. Reed and Co. Ltd., London)
THE APPLICATION OF PMA + OXINE PRESERVATIVE TO MECHANICAL WOOD PULP
Norsk Skogind. 14:151-154 (April 1960)

A combination of phenylmercury acetate (PMA) and oxine is the most frequently used preservative for storage of wood pulp without development of undesirable mold growth such as red rot. The corrosive nature of the chemicals requires supply and storage of the concentrate (a 30% solution of equal parts PMA and oxine) in glass or polythene containers and use of wood, plastic or plastic lined storage tanks, pipes and pumps. The solution preferably is applied as a 0.1% solution, and is added to the system at a point where it will be intimately mixed with the pulp; 40 gm of active material per wet ton (50% dry) gives good protection. Treatment should be continuous even through the winter. Although the pulp may freeze at that time, recurrent or occasional thawing conditions may encourage rapid development of dormant microorganisms. A modern plant applying the PMA + oxine preservative is described.

Wood, pulp, toxic, 8-quinolinol, phenylmercury compounds

1961 Wood 69
Vol.19 PDL-41553

Smeal, Thomas W., M.L. Wolfson, and C.W. Leach (United States Steel Corp. Applied Research Laboratory, Monroeville, Pa.)
HOT- AND COLD-SOLVENT TECHNIQUE FOR CREOSOTE EXTRACTION
Forest Products J. 11:409-416 (September 1961)

An improved method for extracting creosote from wood consists of continuously percolating fresh toluene at room temperature through a vertical column of finely divided wood shavings until the effluent is colorless. The solvents are then stripped from the extracts under partial vacuum at relatively low temperature.

Statistical analysis of data indicate that more preservative is extracted by this method than by the hot-toluene method, and the extract is probably more representative of the retention. Use of fine sized shaved particles permits faster and more complete extraction than wood split in the conventional manner. Some loss occurs in recovering the extracted preservative, calculation by weight difference gives a more accurate estimation than calculation of weight of extract. The amount of residue in the preservative has a definite bearing on the manner of preparation and the method of extraction that will be necessary to effect a complete extraction. At high retention levels, the cold-solvent method accomplishes more complete extraction than the hot-solvent method; however, at low retention level there is no difference between the methods.

Wood, toxic, creosote, analysis

PDL-41568

Hudson, Monie S.
METHOD FOR DETERMINING PRESERVATIVE CONTENT OF WOOD
U.S. Pat. 2,992,902; July 18, 1961. 4 p.

A nondistillation process is described for determining rapidly at atmospheric temperature and pressure the future service life of a preservative treated pole. A boring of predetermined volume taken along the cross-

sectional diameter is ground into minute particles; these are mixed in a definite volume of liquid in which the preservative is soluble, and the color intensity is compared with a standard solution to determine the weight of preservative per cubic foot of pole. If cresote is the preservative, a suitable solvent is dimethylformamide. A series of standards equivalent to 2,4,6,8 and 10 lb creosote per cu ft of pole is prepared from old creosote obtained by extracting sections of the outer half in. of a 15 yr old creosoted pole. A pole with less than 2 lb creosote per cu ft should be discarded; one with 2 to 8 lb can be reused if given a heavy ground line treatment with creosote; one with 8 to 12 lb can be expected to last another 5 yr; one with more than 12 lb can be expected to give an additional 15 yr service. Other preservatives, e.g., copper naphthenate and pentachlorophenol can be determined similarly using appropriate solvents and standards.

Wood, poles, toxic, creosote, analysis

PDL-41545

Wilson, W.J. (New Zealand. Forest Service. Forest Research Institute)
THE DETERMINATION OF BORON IN TREATED WOOD
Anal. Chim. Acta 19:516-519 (December 1958)

A spot test is described for determining the approximate amount of boric acid in treated wood. A 10% alcoholic solution of turmeric is applied to the dry cross section of wood; after this has dried a saturated solution of salicylic acid in a mixture of hydrochloric acid and ethyl alcohol is sprayed on. A bright red color developing on drying indicates the presence of approximately 0.30% boric acid, a brown-red or yellow-brown, 0.25% and a yellow, 0.10%. For fast growing pinus species which develop an intense color, a modified salicylic acid solution is used. If the boric acid concentration is less than 0.25% (0.20% is the required minimum), the wood is analyzed chemically. A 5 gm sample is ground, ashed in the presence of

barium hydroxide, then titrated with sodium hydroxide in the presence of mannitol. The volume of alkali consumed after mannitol addition is equivalent to the amount of boric acid present.

Wood, toxic, boric acid, analyses

PDL-39377

Badische Anilin- & Soda-Fabrik A.-G., Ludwigshafen, Ger. (by Achilles Vlachos and Gerhard Florus)
METHOD OF PROTECTION OF LACQUERED WOOD AGAINST DISCOLORATION BY LIGHT AND ACID COMPOUNDS
Ger. Pat. 1,019,590; November 14, 1957. 3 p.

Discoloration of wood by the combined action of light and acid components in varnish is prevented by treating the wood surface with weakly alkaline solutions which form complex compounds with metals. Especially suitable are soluble salts of glycine, glutamic acid, β,β-iminodipropionic acid, nitrilotriacetic acid, hexamethylenediamineacetic acid, cyclohexanonetetrapropionic acid and phosphoric acid. These compounds generally are used in 10 to 20% concentrations in aqueous solution or in mixture with organic solvents, e.g., glycol ethers and alcohols. Cherry, nut, beech, poplar, birch, elm, maple and oak wood treated with 10 to 20% sodium phosphate solutions (or a mixture of 50% phosphoric acid with 10% sodium hydroxide) of pH 7 to 9, then dried and coated with acid-hardening varnish showed no color change after 8 wk outdoor exposure or 15 hr under the sun lamp.

Wood, coatings(organic), discolorationproofer, patent, foreign

PDL-37721

Zycha, H., and W. Brand
A MICROSCOPIC METHOD OF ESTIMATING THE DEGREE OF DESTRUCTION OF SPRUCE WOOD BY FOMES ANNOSUS (in German with English summary)
Phytopath. Z. 35:411-419 (June 1959)

Wood, spruce, decay, Fomes, measurement

Deterioration
NRC

1961 Wood 72
Vol.19 PDL-41486

Lindgren, Ralph M., and Wallace E. Eslyn (U.S. Forest Service. Forest Products Laboratory, Madison, Wis.)

BIOLOGICAL DETERIORATION OF PULPWOOD AND PULP CHIPS DURING STORAGE

Tappi 44:419-429 (June 1961)

The amount and causes of microbiological deterioration of pulpwood and pulp chips during storage are compared, with particular emphasis on southern pine and hardwoods. Damage to chips is greatest in the outer few feet of the sides of piles and develops faster in such hardwoods as gum and oak than in pine. General but not intense nonfungus discoloration of chips occurs in pile interiors. Overall damage appears to be less in pine, possibly somewhat greater in gums, and probably no more in oak chips than usually occurs in stored rough pulpwood of similar species. Microfungi that produce a condition known as soft rot are an important cause of deterioration in all chip piles. Wood decaying Basidiomycetes, the primary destructive agents in pulpwood, also are important in hardwood piles. Soft rot fungi characteristically are found in the highly cellulosic secondary walls of the wood fibers, forming spirally oriented cavities which often are rhomboid in shape. These fungi utilize the cellulose of wood principally, attack hardwoods much more readily than softwoods, and can develop in wood exposed to environments that are unfavorable for growth of the typical wood decay fungi.

Pulpwood, fragments, storage, fungi, discoloration